Gender differences in the labour market: The case of Vietnam

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Summary

This thesis aims at providing better understanding about gender differences in the labour market in Vietnam.

In the first empirical chapter, we investigate within the context of Vietnam how circumstances at age 15 or 16 relate to completion of upper secondary education four years later. We exploit the longitudinal elements of Vietnam Access to Resources Household Survey (VARHS) to identify household and commune characteristics and emphasise how the effects of these characteristics vary by gender. The gender differences we find suggest that unequal treatment of girls within their households has a negative impact on their educational attainment and that in the absence of such unequal treatment the reverse gender gap would be even larger.

In the second empirical chapter, we examine the factors that are associated with the allocation of male and female labour into wage/salaried employment or self-employment in the urban labour market by using the Vietnam Household Living Standard Survey (VHLSS). Having more education increases the propensity for both men and women to be in wage/salary sector. We find that the probability of working in the wage/salaried sector decreases for both genders due to the burden of the child care. However, sharing child care with the elderly in the household may be the way for women to exit self-employment to be wage-earners. We find significant gender differences in employment allocation. Men are more likely to work in the wage and salaried sector whereas women are more likely to be self-employed. However, in practice, most self-employment jobs in Vietnam are own-account vendors, which reflects insecurity rather than flexibility.

The third empirical chapter examines the gender wage gap in urban Vietnam, using the Vietnamese Household Living Standard Survey (VHLSS). Since men are more likely to be employed in the wage-salaried sector while women are more likely to be self-employed, we employ the Heckman two stage and the Dublin and McFadden methods to correct for selectivity bias in employment sectoral allocations. We find that women, on average, earn around 8 percentage points less than men. However, after the selection bias correction, the gender wage gap becomes even bigger, with women earnings around 40 percentage points less than men's. Additionally, the gap is predominantly attributable to unexplained factors vis. discrimination.

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Chapter 1

Introduction

1.1 Preface

One of the key objectives in development policies is inclusive and sustainable economic growth, which can be obtained if wealth is shared and income inequality is addressed well (United Nations, 2015). However, economic growth is a gendered process (see Cavalcanti and Tavares 2016; Dollar and Gatti 1999; Kabeer and Natali 2013; Klasen 1999; Seguino 2000). Therefore, a better understanding of gender facet in labour market will help to produce good policies that not only strengthen women's position, but also promote growth because gender inequalities can be barriers to the economic growth, both directly through education, and labour market, and indirectly through intergenerational transmission in family relations. Despite many efforts to promote gender equality as a counter to economic vulnerability and poverty, women continue to face numerous challenges regarding employment, work choice, working conditions, wage parity, and discrimination. Gender differences in the labour market, thus, remain intransient across many parts of the world, and especially pronounced in developing countries (ADB&ILO, 2011).

After many years of transitional development following the announcement of comprehensive economic reform in 1986 (i.e. known as 'Doi Moi'), Vietnam has made impressive progress towards poverty reduction and gender equalities in education, employment and health (Jones & Anh, 2012). However, women still face deep-rooted discrimination since the social norms and Vietnamese culture is affected by Confucianism, which encourages the patrilineal and patrilocal systems in society (Goodkind, 1995; Jones & Anh, 2012). Therefore, the main aim of the thesis is to provide better understanding about gender differences in the labour market in Vietnam because understanding the drivers behind the constraints that women face can help to develop new policies that better support women in their life, and yield benefits at multiple levels within household, in the labour market,

and in the boarder macro-economy. In particular, the thesis focuses on three issues: (i) gender gaps in education; (ii) gender gaps in labour allocation into wage salaried employment and self-employment; and (iii) gender gaps in wages.

1.2 Research overview

During the end of the 1980s and the beginning of the 1990s, the world witnessed a series of historic events regarding the collapse of communism in the Soviet Union and East Europe. Substantial changes occurred, transferring state-organised economies market-based economies (Paci & Reilly, 2004). During the transition process of Central and Eastern Europe, the number of female workers in labour markets declined significantly, which was noted in the research of Allison and Ringold (1996). Additionally, output deduction was linked with resource misallocation, which led to an adverse effect in income level and distribution. This implied profound labour market changes. By the same period, Vietnam experienced a comprehensive economic reforms following many changes in the labour market. Therefore, an overview of gender differences in the labour market from different perspectives is discussed in Chapter 2. In particular, it covers the differentials in labour force participation, (un)employment, employment allocation, education and wage.

After sketching the overview of gender differences in the labour market, we conduct three main empirical studies in the following chapters.

Firstly, education sets Vietnam apart from other developing countries, especially in terms of its quality. It is illustrated by the higher PISA scores of 15-year-old students as compared to other developing countries (Dang & Glewwe, 2018). The Vietnamese PISA scores can also be comparable to that of many high-income countries. In common with many high-income countries, there is the reversal of the gender education attainment gap in Vietnam, which refers that girls and women outperform schooling and obtain higher education than boys and men. This reverse gap emerges most dramatically at the upper secondary level. Thus, in Chapter 3, we investigate the determinants of this gap using the Vietnam Access to Resources Household Survey (VARHS) to address following research questions: (i) What are the determinants of education attainment? (ii) Whether there is any gender difference in education attainment (i.e. completion of upper secondary education); And (iii) What factors could explain the education gap between males and females? The approach we take is to investigate how circumstances at the age 15-16 related to the completion of upper secondary education four years later.

Secondly, the gender education gap in favour of women emerged around the turn

of the century and has widened since then in Vietnam (Dang & Glewwe, 2018). Nevertheless, female earnings, on average, are still lower than male earnings (GSO, 2017; Liu, 2004; Pham & Reilly, 2007). Why do female earnings lag behind male earnings despite females being generally more educated males? A possible reason for this outcome is the sectoral allocation of female labour. Therefore, Chapter 4 utilises the Vietnam Household Living Standard Survey (VHLSS) to explore the evolution of the employment structure in Vietnam. It addresses two main research questions: (i) Whether there is any gender difference in employment allocation? And (ii) What would be the process of female employment allocation if it were the same as that for males? In particular, we examine factors that are associated with the allocation of male and female labour into wage salaried employment or self-employment in the urban labour market.

Thirdly, it is undeniable that women, on average, earn less than men in most parts of the world (ILO, 2013, 2015). The main driven factors that influence the gender wage gap could come from the differences in labour force participation, education, working experience, labour division, and job segregation (Blau & Kahn, 2017). In contrast to developed countries, it is quite common in developing countries that many people work outside of the wage sector. For example, half of workers in developing countries are in wage salaried sector as compared to 85 per cent in developed countries. Therefore, following Chapter 4 on the gender difference of labour allocation into wage salaried employment or self-employment, Chapter 5 utilises the same data set to examine the gender wage gap for employed workers in urban Vietnam to address three research questions: (i) What are key determinants of male and female earnings? (ii) What is the extent of any gender differences in male and female wages? And (iii) Which factors might explain the gender wage gap?

In summary, all three main empirical provide a comprehensive and systematic study in Vietnam through the lens of gender, which covers gender studies on education economics and labour economics. Moreover, these studies also offer a modest contribution to the empirical literature by using more recently-updated data in Vietnam. The insights from the results are potentially important for policy makers to obtain the inclusive growth by mitigating gender inequalities.

1.3 Research structure

Apart from the current introduction chapter, the rest of the thesis is outlined as follows

(i) Chapter 2: Gender differences in the labour market: Perspective from Viet-

nam, Asia and transition economies

(ii) Chapter 3: Puzzle me this? The Vietnamese reverse gender education gap

(iii) Chapter 4: Gender differences in sector allocation: The case of urban Vietnam

(iv) Chapter 5: The role of selection bias in sectoral allocation and the gender wage gap in urban Vietnam

(v) Chapter 6: Conclusion

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Chapter 2

Gender Differences in the Labour Market: Perspective from Vietnam, Asia and Transition Economies

2.1 Introduction

Whilst their voracity may differ widely across regions, nations or even localities, gender differences in labour market outcomes remain intransient across many parts of the world (ADB&ILO, 2011). Despite many efforts to promote gender equality as a counter to economic vulnerability and poverty, women continue to face numerous challenges regarding employment, work choice, working conditions, wage parity, discrimination and work-life balance. These problems are especially pronounced in developing countries. It is estimated that the limited employment opportunities of women have resulted in an annual loss of more than US$42 billion in the Asia and Pacific regions, leading to a decrease in per capita income growth rates of 0.1-0.3 percentage points (ADB&ILO, 2011). This chapter provides an overview of gender differences in labour market outcomes in Asia and transition economies generally, and in Vietnam specifically.

Many Southeast Asian economies initiated economic reform in the 1980s, after the Chinese reform process of the late 1970s that followed the Cultural Revolution, and before the Central and Eastern Europe (CEE) transitions resulting from the collapse of the Soviet Union in the late 1980s and early 1990s. Although the Southeast Asian transition economies, on balance, enjoyed more favourable initial conditions that the CEE economies (IMF, 2000), the transition from centrally-

planned to market-oriented economies in such economies implied profound labour market changes (Lehmann & Muravyev, 2013). Indeed, prior to the transition in 1990s, many large state enterprises had been protected against the influence of global markets throughout the central planning period whilst the labour market was strongly regulated so that employees reaped benefits from employment security and job stability (Cazes & Nesporava, 2003). Nonetheless, the onset of transition saw a rapid collapse in the demand for labour, and so output, and as the state sector largely shrunk, these large state enterprises all but evaporated. After a decade, robust economic growth eventually returned to the region, at least until the 2008 financial crisis (Lehmann & Muravyev, 2013). In general, after the initial transition shocks, the adjustments of the labour markets occurred. Consequently, the analysis of selected key indicators of the labour market may be a good illustration for the evolution of the labour market.

However, it is difficult to ascertain what precisely the impact of the labour market shifts has been in general, and especially in the case of women regarding their occupational changes and work opportunities since it has been a continuing discussion among experts and policy makers due to inadequate data and different interpretation of existing data (United Nations, 2006). Therefore, this chapter attempts to analyse some selected key indicators of the labour market through the lens of gender in Vietnam, Asian and transition economies.

The chapter is organized as follows: Section 2 discusses the gender differences in labour force participation and employment while the differentials in unemployment are discussed in Section 3. Section 4 describes the evolution of employment allocation during the transition period in general and through lens of gender specifcally. The gender gap in educational attainment is discussed in Section 5 whilst Section 6 describes the gender differences in wage.

2.2 Labour force participation and employment

In the transition period, there have been considerate variations in rates of labour force participation (see Figure 2-1) and employment (see Figure 2-2) in Vietnam, Asian and CEE transition economies.

Figure 2-1 and Figure 2-2 depict variations in labour force participation rates (LFPRs) and employment-to-population ratios (EPRs) across Asian countries and CEE transition countries since 1990. The variations could be explained by the large-scale collapse in participation in the era of transition in the former Soviet Union, and the centrally-planned economies of CEE region (Newell & Reilly, 2001).

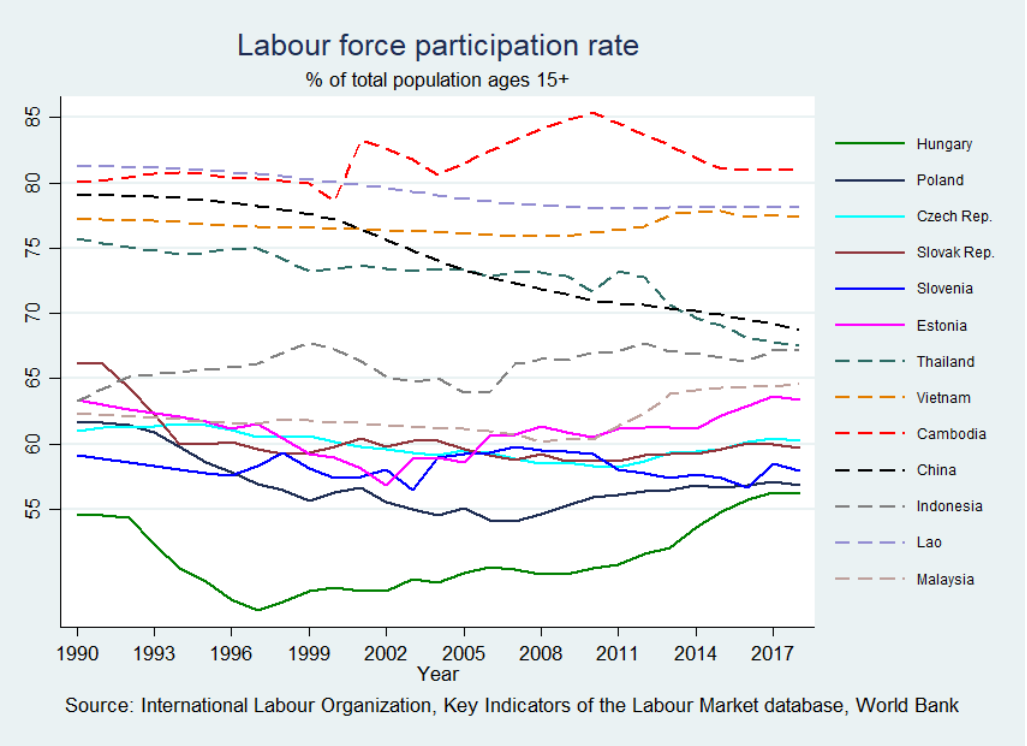

Figure 2-1: **Labour force participation rates in Asian and CEE transition economies, 1990-2018**

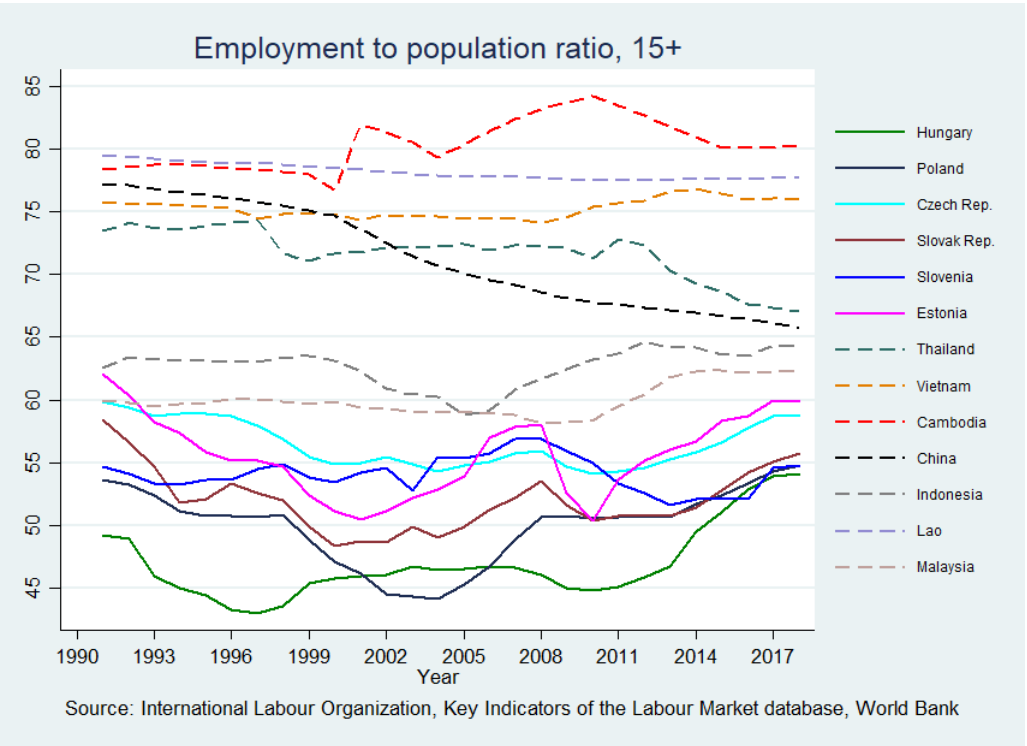

Figure 2-2: **Employment-to-population ratio in Asian and CEE transition economies, 1990-2018**

Within Asia, the labour force participation rate (LFPR) of Laos has slightly dropped whereas the LFPRs of Cambodia and Indonesia have increased moderately since 1990. After experiencing its lowest rate of labour force participation in 2000, Cambodia experienced a gradual rise in the LFPR until 2012 (ADB, 2013). The LFPR of Indonesia, however, fluctuated in the 1990s before steadying in the early 2000s. China and Vietnam shared the same pattern of labour force participation at the beginning of the 1990s, but after two decades, the Vietnamese LFPR was significantly higher than that of China since there was a plunge in the Chinese LFPR after 2000. The differential between Vietnam and China, for instance, was estimated to be around 6 percentage points in 2014, rising to around 10 percentage points in 2018. The LFPR in Thailand appears fairly stable since 1990, except for a substantial drop in 1999 following the Asian financial crisis in 1997 and another sizeable drop in most recent years. Notably, Malaysia is the country with the lowest LFPR compared to neighbouring countries although it has increased significantly since 2010. The employment-to-population ratios (EPRs) are very similar to the LFPRs for all countries.

In short, the labour market in Vietnam, Cambodia, Laos, Thailand and China are characterized by high participation rates and employment rates (Cameron, Malcolm Dowling, & Worswick, 2001; Chen, Ge, Lai, & Wan, 2013) since only a small proportion of population can afford to remain outside of the labour force due to their poverty (ILO, 2014). Nonetheless, Malaysia has been a country in upper-middle income group since 1990s among Asian countries, which may be an explanation for lower LFPR and EPR.[1]

With regard to CEE transition economies, their LFPRs and EPRs, in general, plunged in the 1990s due to the collapse of the former Soviet Union, and began to fluctuate in the 2000s. Among CEE nations, Hungary was the country with the lowest LFPR and EPR, each of which, on average, accounted for approximately 53 per cent annually. Its rates reached the lowest point at 49 per cent in 1997. Similarly, Poland had the same downturn in both the LFPR and the EPR in spite of a higher starting point in 1990, but it took more time to bounce back. The Poland's EPR went into free-fall in the early 2000s.

[1]According to World Bank classification, at the beginning of 1990s, Vietnam, Laos and Cambodia was low-income countries whilst Thailand, Indonesia, and China were lower-middle income economies. However, some nations such as Thailand, and Vietnam have recently moved to a higher level in terms of World Bank's national income classification.

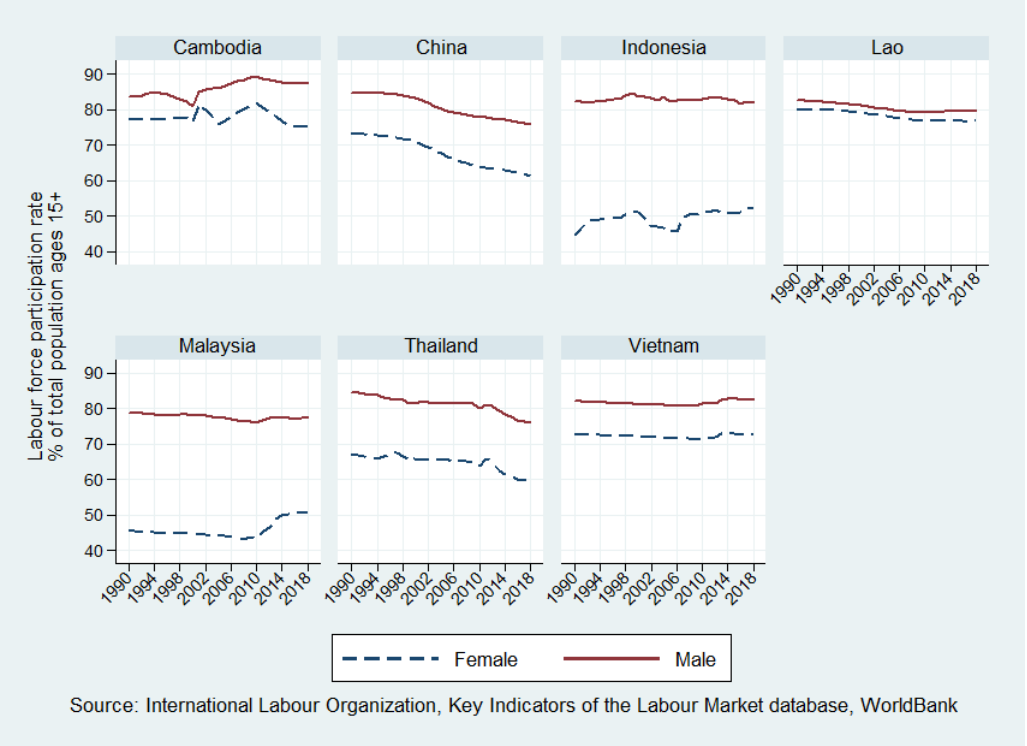

Figure 2-3: **Labour force participation rate in Asia countries, by gender, 1990-2018**

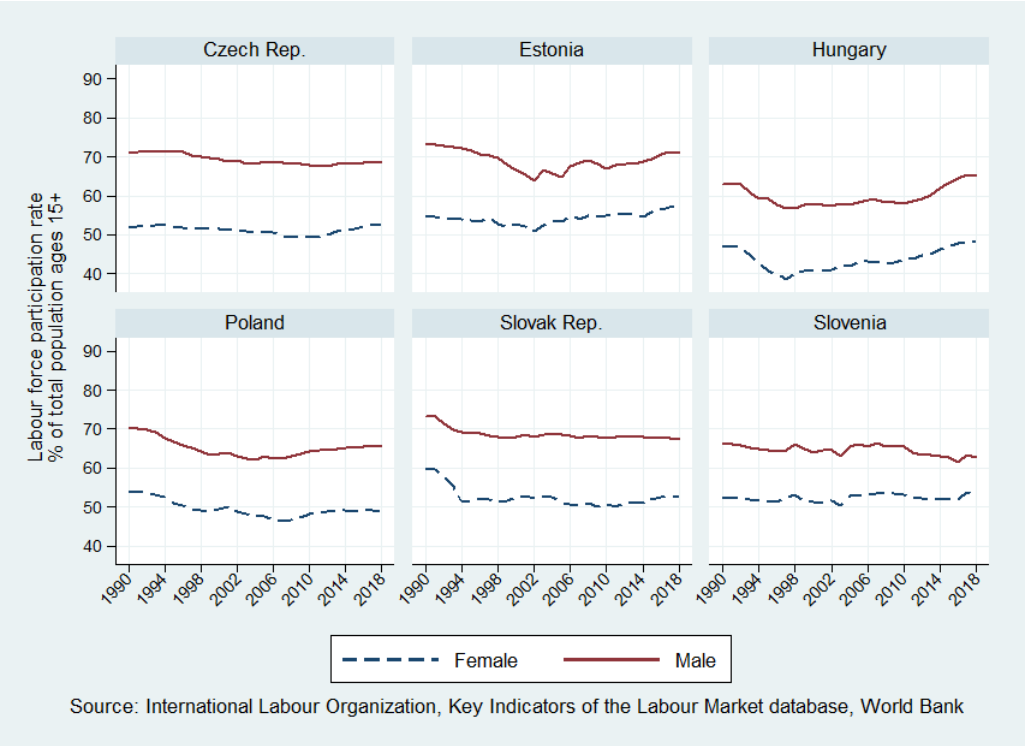

Figure 2-4: **Labour force participation rate in some CEE countries, by gender, 1990-2018**

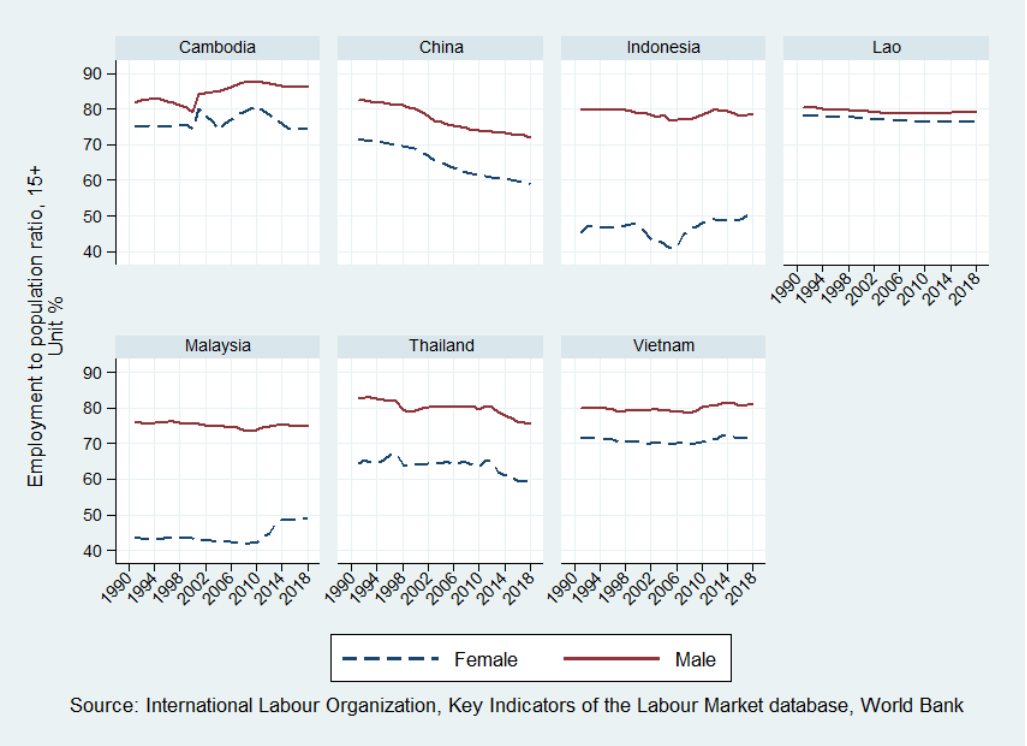

Figure 2-5: **Employment-to-population ratio in Asia countries, by gender, 1990-2018**

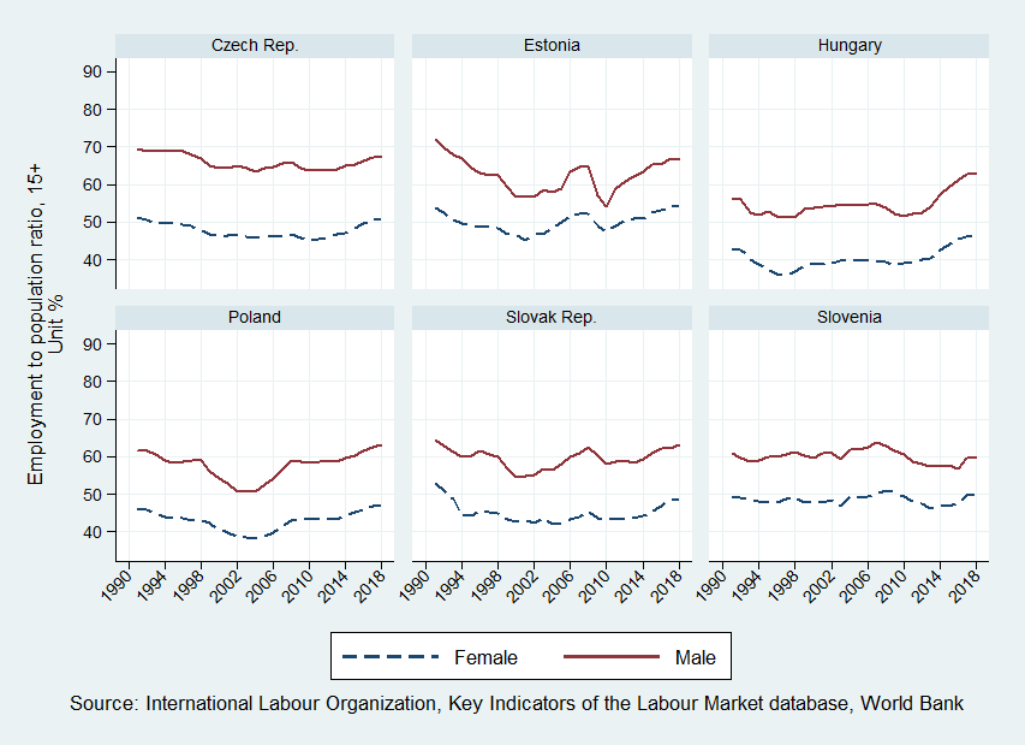

Figure 2-6: **Employment-to-population ration in some CEE countries, by gender, 1990-2018**

In terms of gender, female LFPRs and EPRs are lower than those of men in most Asian and transitional economies (Newell & Reilly, 2001; Rutkowski, 2006). The gender gaps vary across countries and regions since women's labour market and overall living standard deteriorated during the transition (United Nations, 2006). Figure 2-3 and Figure 2-4 present the gender differentials in LFPRs in Asia and CEE transition economies respectively while Figure 2-5 and Figure 2-6 illustrate the gender gap in EPRs in these regions. On the surface, in most countries, gender inequality has remained over the course of the transition because this has caused a deterioration in both women's and men's labour market position (United Nations, 2006).

In Asia, there are small differentials between men's LFPR and women's LFPR in Vietnam and Thailand whereas Malaysia and Indonesia experienced sizeable gender differentials in LFPRs, to which the low female LFPR may make a contribution (ILO, 2008). For example, the gender gap in LFPR in either Malaysia or Indonesia, on average, was reported to be over than 34 percentage points in 2010-2012 (Priebe, Howell, & Sari, 2014). The female LFPR is desperately low, the reasons for which are not entirely understood (Fernandez, 2011). We decompose female LFPRs in terms of age in Figure 2-7. In 2014, female LFPRs in the mid 30-mid 40 age groups, on average, increased by 9 percentage points as compared to 2011 while female LFPRs in the older groups (i.e. over 50 years old) moderately raised, reflecting that elderly female workers tend to stay longer in the labour force.

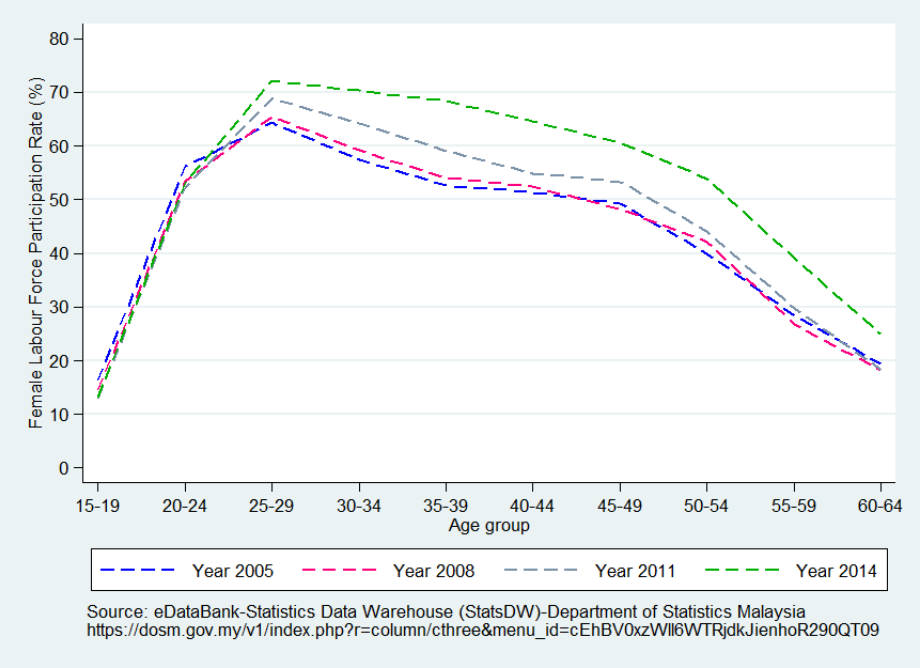

Figure 2-7: **Labour force participation rate by age group, Malaysia, 2005-2014**

Strikingly, the largest gender gaps in LFPRs were observed in Pakistan, India and Sri Lanka, where there are a lot of barriers relating to education, culture, and institutions that women encounter when getting involved in the labour market (OECD, 2014). This is in contrast to transition economies in CEE region, where the gender gaps in LFPRs appear smaller, accounting for around 12 percentage points (Rutkowski, 2006). However, Hungary and the Czech Republic are countries with a relatively high gender gap in LFPRs among CEE nations, accounting for 16.3 and 18.5 percentage points, respectively.

Noticeably, the gender gap in China's LFPR widened from 12.1 percentage points in 1990s to 14.4 percentage points in 2013 (ILO, 2015b) whereas the gender gap in Vietnam's LFPR has been persistently constant, for example, around 9-10 percentage points over two decades since 1990s (GSO, 2015b). To our best knowledge, no study provides an explanation such a persistent LFPR gender gap in Vietnam. The drop in China's LFPR resulted from a marked decline in the participation rate of young men and women (i.e. 15-24 aged group) by 20 and 26 percentage points, respectively, between 1990 and 2010, which indicates that the youth in China is likely to stay longer at school for studying (ILO, 2015b) (see Figure 2-8). In addition, the cohort with the next largest decline in LFPR is women aged 25-34 due to child-bearing which might increase the likelihood of their withdrawal from the labour market (ILO, 2015b).

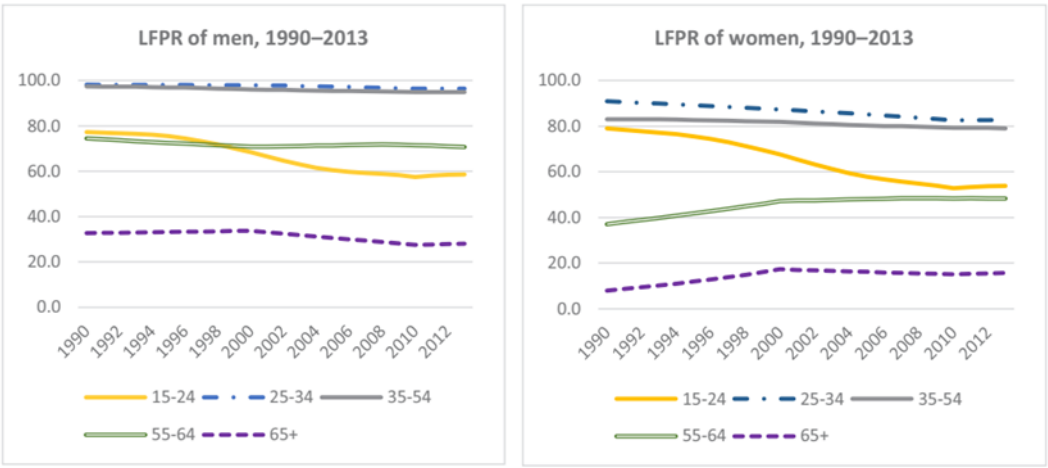

Figure 2-8: **Labour force participation rate in China, by gender and age group, 1990-2013**

Source: International Labour Organization, Key indicators of the labour market database (ILO, 2015a)

With regards to Cambodia, Vietnam's neighbouring nation, the LFPR gender gap was around 11 percentage points, in which males' and females' LFPR were 81 per cent and 70 per cent, respectively, in 2007 (NIS, 2008). Then the gap dropped

slightly by 3 percentage points in 2017, particularly, 88.8 per cent for males and 80.1 per cent for females (NIS, 2018).

2.3 Unemployment

The onset of the transition saw a rapid collapse in the demand for labour, and massive labour and job reallocation between a declining public sector and an emerging private sector. This economic restructuring engendered structural mismatches which contributed to structural unemployment (Garibaldi & Brixiova, 1998; Rutkowski, 2006).

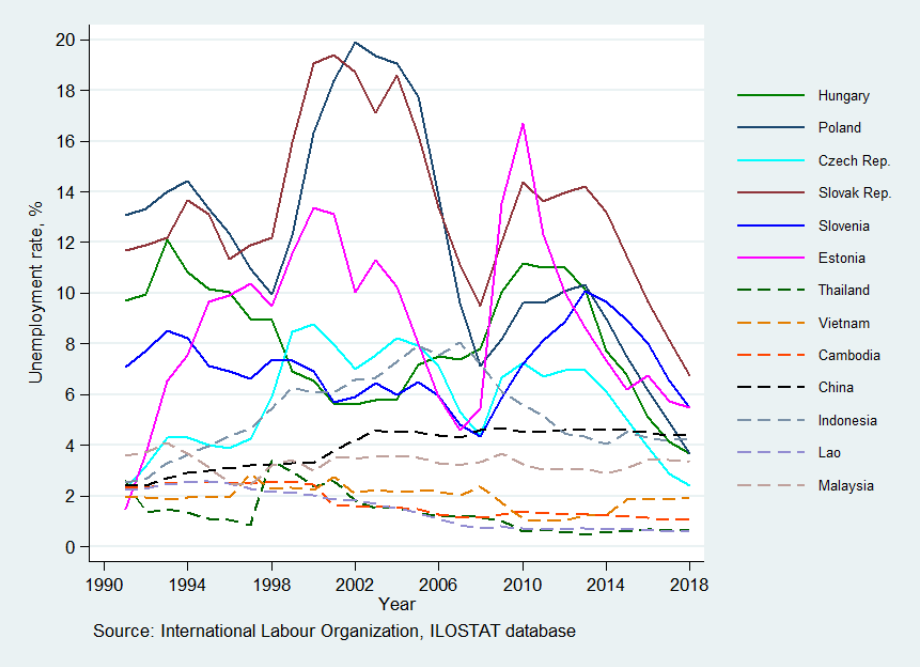

Figure 2-9: **Unemployment rates in Asia and CEE countries, 1990-2018**

Figure 2-9 shows unemployment rates in Asia and CEE transition economies. In CEE countries, unemployment had been virtually non-existent under the central-planned system (Garibaldi & Brixiova, 1998), but rose sharply on the course of the transition. Average unemployment reached double-digit level in most CEE countries with the notable exception of the Czech Republic (Boeri & Burda, 1996; Garibaldi & Brixiova, 1998). For example, the unemployment rate reached to 19-20 per cent at the beginning of 2000s in Hungary and Poland. Surprisingly, similar patterns were not observed in economies of Commonwealth of Independent States (CIS), for example, Russia and Ukraine, where moderate increases in unemployment arose despite a higher cumulative output fall in gross domestic production (GDP) than CEE economies (e.g. 50 per cent as compared to 20-30 per cent)

(Garibaldi & Brixiova, 1998).

In contrast to the high unemployment rates of CEE economies, the unemployment rates in Asia was much lower. Among Asia countries, Indonesia is the country with highest unemployment rate. Its unemployment rate rose throughout the 1990s, peaking at 8 per cent in 2005. The high unemployment rate was a result of inefficient governance and resource allocation (ILO, 1994). However, this upward trend came to an end and started plummeting to around 4 per cent in 2014, still higher than any other country in the region. In China, the unemployment rate gradually rose from 1990, and then rose further from 2000 to 2003 before leveling off at 5 per cent annually since then. Thailand experienced a rise in its unemployment rate right after the financial crisis in 1997, and then gradually dropped closed to where it began in 1997.

Turning to Vietnam, unemployment has barely changed since 1990. The unemployment rate started to fall down in 2008 to reach its lowest plateau prior to a slight rise in 2014 when 47.3 per cent of the youth people 15-24 years were unemployed (GSO, 2014). Among the unemployed youth people, those with college or above accounted for 15.5 and 14 per cent, respectively. This suggests that more and more students after graduation become unemployed because they are more likely to look for suitable and stable jobs whereas those with lower education attainment are ready to do more simple jobs (GSO, 2014). Similarly, youth unemployment is also a long-standing concern in Indonesia because the youth accounts for over 50 per cent of the unemployed population (ILO, 2015a). However, it is argued that youths with higher levels of educational attainment are active in seeking suitable jobs, which may be linked to a higher likelihood of meeting the job vacancy criteria of employers in the future (ILO, 2015a). In general, the situation underlines the importance of delaying labour market entry for the youth and supporting the continuation of their participation in education and training that is responsive to the needs of the labour market.

Figure 2-10 and Figure 2-11 illustrate the gender gap in unemployment in Asian and CEE countries. In CEE region, the transition affected women more than men since women unemployment rates were higher than that of men in most of countries, especially in Czech Republic, Poland, and Slovak (United Nations, 2006). However, female unemployment rates were substantially lower in Hungary, Estonia, and Poland. For example, according to Newell and Reilly (2001), around 1.5 million female jobs disappeared in the first years of transition in Poland.

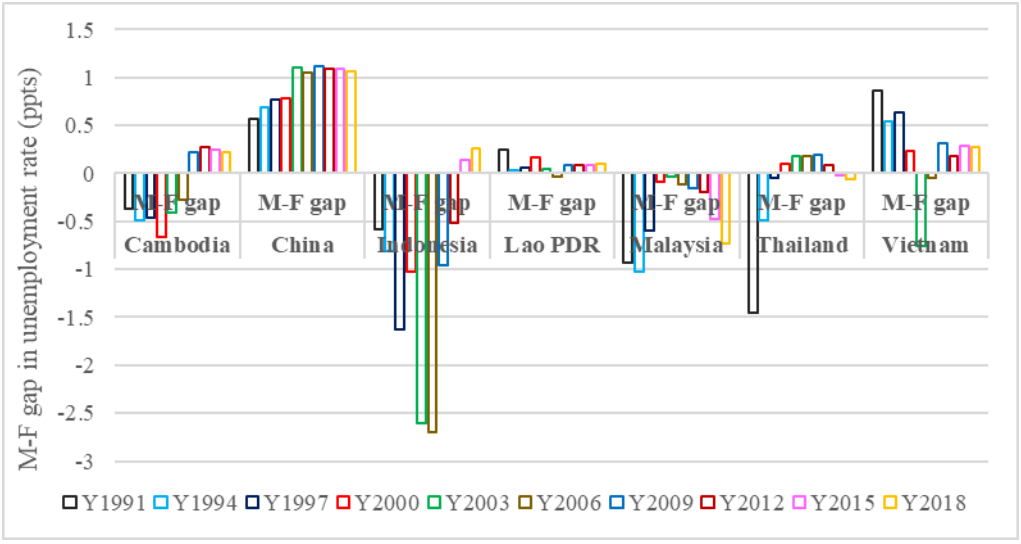

Figure 2-10: **Male-Female gap in unemployment in Asia countries, 1991-2018**
Source: International Labour Organization, ILOSTAT database

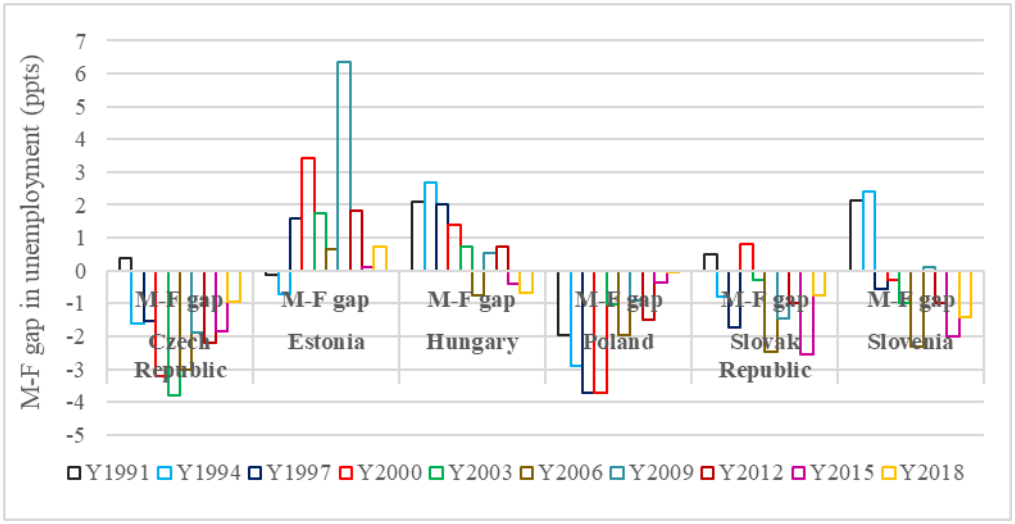

Figure 2-11: **Male-Female gap in unemployment in CEE transition countries, 1991-2018**
Source: International Labour Organization, ILOSTAT database

With regards to Asian countries, the gender gaps in unemployment rates have been much smaller than those of CEE countries. In China, male unemployment rates have been persistently higher than female unemployment rates over the time. Similarly, Vietnam experienced a positive gender gap in unemployment rate most of the time with the exception of the reverse gender gap in unemployment in 2003. However, there have been significant reserve differentials in unemployment in Indonesia and Malaysia since 1990s. For example, the reverse gender gap in Indonesia reached 2.6 percentage points in 2003, and 2006. The gender gap in unemployment has been convergent in Indonesia recently.

2.4 Employment by sector

Prior to the transition, labour markets were strongly regulated with workers in socialist economies having regular, full time wage and salaried employment with a range of fringe benefits (Rutkowski, 2006). During the course of transition, there were dramatic changes. For example, job security was largely lost as a result of the collapse of large state-owned enterprises and widespread institutional change. An increasing number of workers turned to fixed-term, temporary employment or even self-employment, and state benefits were ended, so firms had to become competitive to stay in business (Rutkowski, 2006). For example, Slovenia and Czech Republic had the highest shares of temporary employment among CEE countries, 12.9 and 8.1 per cent in 2000 respectively, whereas the proportion of temporary employment did not exceed 3 per cent in 2000 in Estonia (Cazes & Nesporava, 2003).

This natural job change was associated with the growth of the informal sector which provides less secure jobs with fewer benefits, for example, more agricultural activities, especially in countries with a large proportion of agriculture employment including Poland, the CIS (Rutkowski, 2006). Informal and self-employment vary across regions. Around 68 per cent of employment in Asia and Pacific is informal whereas the proportion of informal employment in Europe and Central Asia is around 25 per cent (ILO, 2018). In particular, informal sector contributed to national GDP in CEE regions nearly twice as much as in OECD countries, for example, 29 and 17 per cent in 2000, respectively, whereas its contribution in CIS economies was substantially larger, even reaching at 40 per cent in Russian and Ukraine (Rutkowski, 2006).[2] Multiple-job holding is another form of flexible work arrangement where workers hold a second, usually part-time, activities besides their main job.

In addition, Rutkowski (2006) notes the importance of self-employment in transition countries, especially in CEE regions. For example, self-employment in Poland accounted for approximately 30 per cent of total employment. A lower proportion (less than 10 per cent) of total employment in Estonia, and Slovak Republic was self-employment.[3] Furthermore, self-employment is very common in

[2]One form of flexible work arrangement in transition economies is multiple-job holding. This means that workers can hold more than one job, in which the extra jobs are usually part-time activities besides their main job. According to Cazes and Nesporava (2003), the multiple-job holding is closely interrelated with informal employment in the transition economies because of the limited performance of informal employment as a primary activity with no social security and health care insurance.

[3]According toRutkowski (2006), self-employment can be referred to agricultural employment by a different name because farmers are considered self-employed in countries with a high share of agriculture of total employment. However, it is not deniable that self-employment plays an important part outside agriculture.

developing countries since fewer than half of all workers are wage and salary employees compared to over 85 per cent in high income countries in 2010 (Gindling & Newhouse, 2014).

From the transition, another perspective of labour reallocation has been an increase in the relative size of the service sector, with a simultaneous decrease in the relative size of the manufacturing industry sector. This is similar to most transition economies although the patterns may vary across regions and countries (see Figure 2-12 and Figure 2-13).

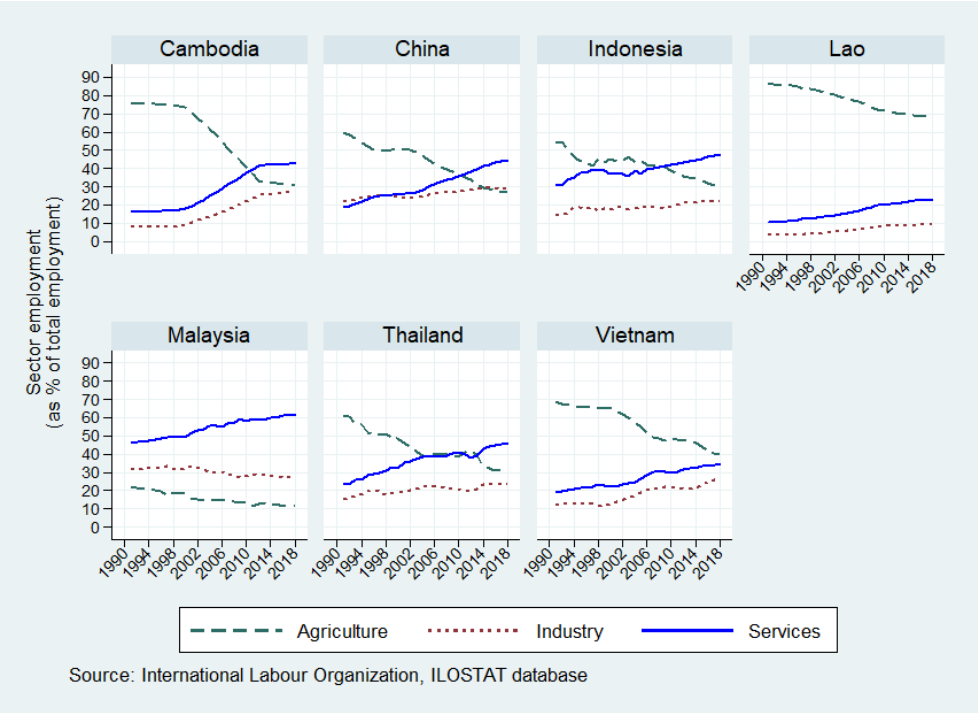

Figure 2-12: **Sector employment as of total employment in Asia countries, 1990-2018**

In reality, there are two main types of self-employed workers, such as aspiring entrepreneurs, and a group of workers to avoid unemployment and earn subsistence income, which is more pronounced in CIS and transition Europe and Central Asia countries with difficult labour market conditions and lack of work opportunities (Rutkowski, 2006).

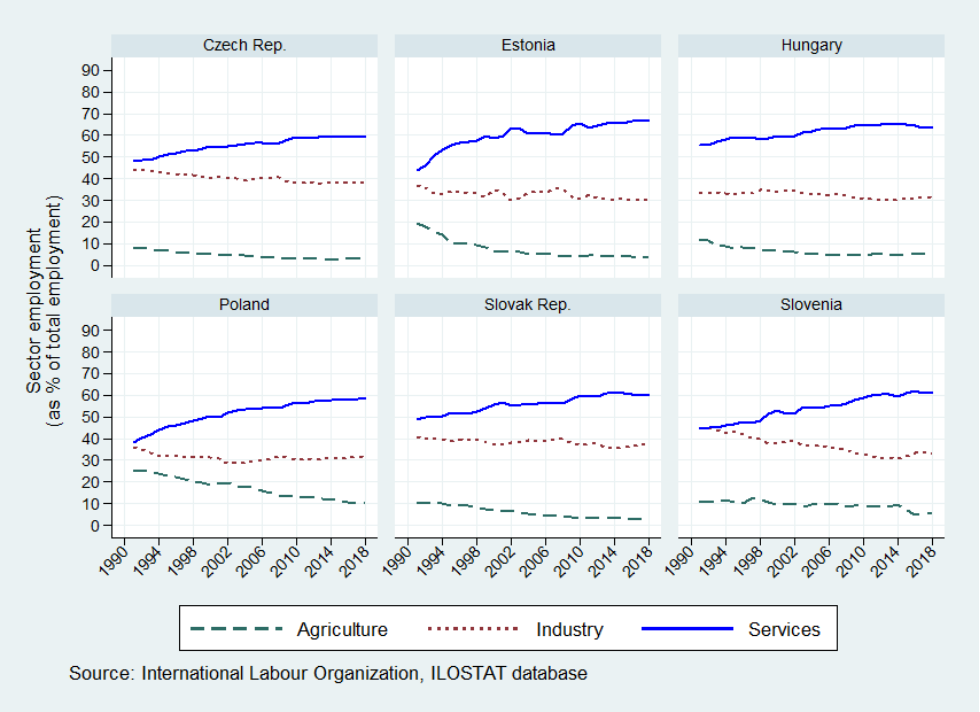

Figure 2-13: **Sector employment as of total employment in CEE transition countries, 1990-2018**

Within CEE countries, Estonia is a good illustration of the most drastic change in the employment structure, with an expansion of its service sector by 19 percentage points, and a contraction of its agriculture and industry sectors by 13 and 6 percentage points, respectively, from 1991 to 2003. In Poland, the change was less dramatic, specifically, an augmentation of the service sector by 15 percentage points notwithstanding a shrinkage of the agriculture and industry sector by around 7 and 8 percentage points, respectively, during the same period. However, there was little change in structural employment over the period from 2003 to 2018.

Like many transition countries, Asian countries also experienced a development of the service sector and a reduction of the agriculture sector. However, the degree of their structural employment changes differs from CEE countries. The main difference between Asian and CEE countries was an increase of the industrial and service sectors at the expense of a shrinkage of the agriculture in Asia. For instance, the agriculture sector in Thailand declined substantially, by approximately 19 percentage points from 1991 to 2003, whereas its industrial and service sectors increased by around 6 and 13 percentage points, respectively, during the same period. The lesser extent to the change of the structural employment happened from 2003 to 2018 in Thailand. In contrast, Cambodia experienced the greater extent to the change of the structural employment from 2003 to 2018, with a large reduction of its agriculture sector by around 34.5 percentage points and the increasing

share of its industrial and service sector by approximately 14.5 and 20 percentage points, respectively. With regards to Vietnam, the share of agriculture employment has been decreasing dramatically from 68.5 percent in 1991 to 40 percent in 2018 whereas the shares of industry and service employment have been doubled since 1990.

In both Asian and CEE transition countries, women have predominately employed in the service sector whereas the industrial sector has been dominated by men (see Figure 2-14 and Figure 2-15). In particular, we observe sizeable gender gaps in industrial employment in CEE transition countries, accounting for more than 20 percentage points on average, which is nearly offset by considerable reverse gender gaps in service sectoremployment. The reverse gender gaps in service employment in Asia, however, are smaller than those in CEE countries, for example, 1.7, 4.3, 5.2 and 5.5 percentage points in Laos, Cambodia, China, and Vietnam, respectively. Malaysia is the only country with a substantial reverse gender gap in service sector employment at 19.6 percentage points, which is similar to the average gap in CEE transition economies. Furthermore, it is evident that gender gaps are overall smaller in the agriculture sector in both regions. This is similar to Razzu (2017)'s findings for Eastern European countries.

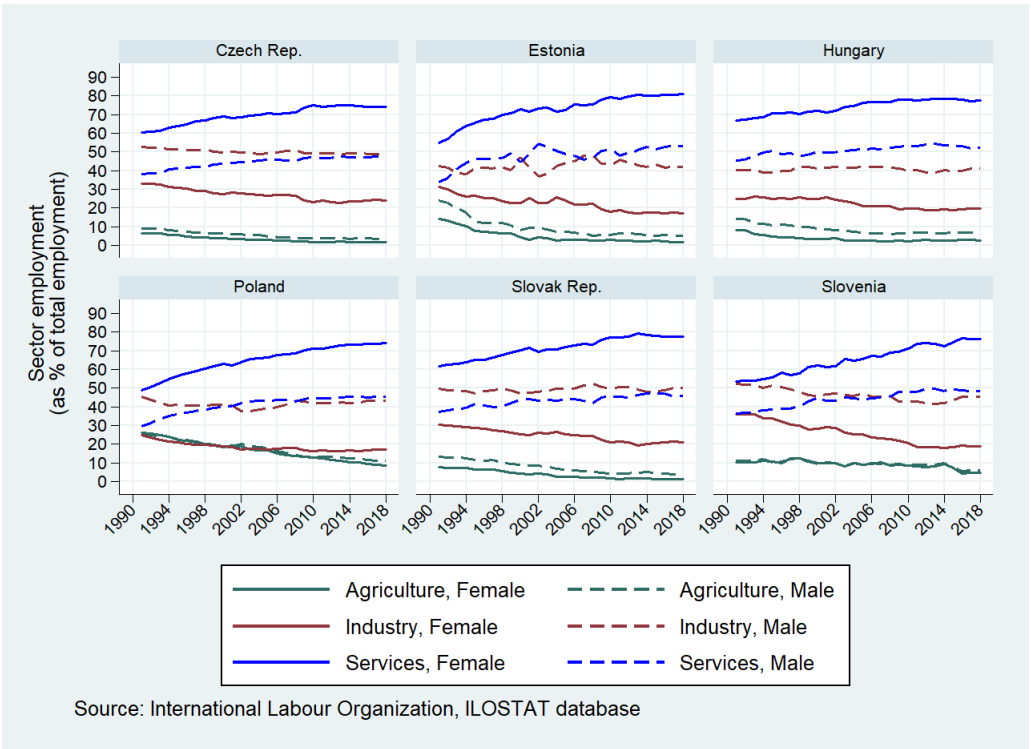

Figure 2-14: **Sector employment as of total employment in CEE transition countries, by gender, 1990-2018**

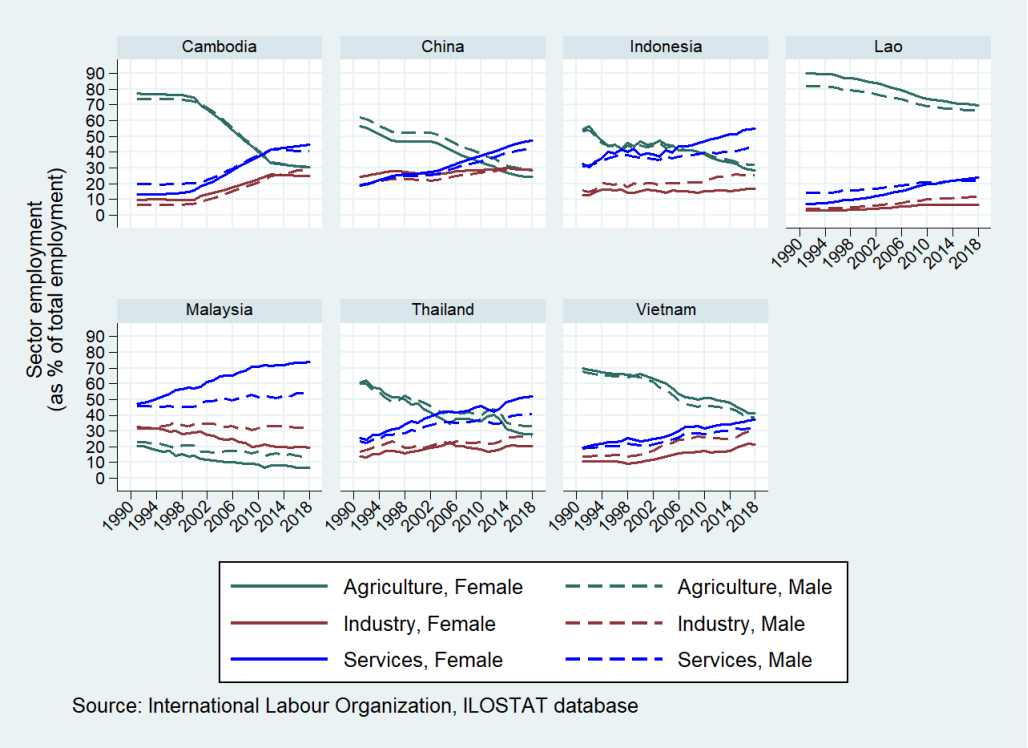

Figure 2-15: **Sector employment as of total employment in Asia countries, by gender, 1990-2018**

Figure 2-14 shows a pattern in CEE transition countries of women leaving the agriculture sector and industrial sector and moving to the service sector whilst men move from the agriculture sector to the service sector. Similarly, Figure 2-15 illustrates a movement of women from the agriculture sector into mostly the service sector and partially the industry sector, especially in the garment and textile industry in Asian countries.

2.5 Educational attainment

Beyond gender inequality in labour force, another aspect that should be taken into consideration is gender inequality in education attainment. Gender equality in education is one of the preconditions for both women and men to achieve equal opportunities in the labour market (Schnepf, 2004).

During the communist period, education was standardised in terms of teaching quality, school curricula, and teacher training to ensure equity in access to education for both boys and girls (Laporte & Schweitzer, 1994). Thus, the stock of human capital inherited from the socialist period was high compared to other countries at similar levels of economic development (Micklewright, 1999). Access to education has been widespread. For example, enrolment in basic schooling,

including primary education and lower secondary education, has become universal, and there has been board equality in access to education between the genders (Micklewright, 1999; Rado, 2001). Enrolment rates at the general secondary level in most CEE countries have risen, with substantial increases in gross enrolment rates in Poland and Latvia. In 1990, more than 90 per cent of 15-19 years old completed at least 8 grades in Hungary (Micklewright, 1999). Enrolment rates at primary and lower secondary education in Vietnam rose from 85.6 per cent in 1992/1993 to 93.7 per cent in 1997/1998, and from 72.3 per cent in 1992/1993 to 86.4 per cent in 1997/1998, respectively (Dang & Glewwe, 2018). Since then, enrolment rates have continued to rise (Dang & Glewwe, 2018). As a consequence of the onset of transition in Asian and CEE transition countries, education spending fell leading to increases in income inequality and poverty (Brainerd, 2000; Newell & Reilly, 2001; Schnepf, 2004).

Table 2.1: **School attendance status in population (5+ years old), Vietnam, 1989-2014**

School attendance status	**Y1989**	**Y1999**	**Y2009**	**Y2014**
Current attending	23.6%	27.6%	24.7%	22.6%
Attended in the past	58.4%	62.6%	70.2%	72.9%
Never attended	18.0%	9.8%	5.1%	4.4%
Total	100%	100%	100%	100%

Source: Vietnam Population and Housing Census, 2009, 2014 (GSO, 2011; GSO, 2015a)

Table 2.2: **School attendance status in population (5+ years old), Vietnam, by gender, 2009-2014**

School attendance status	**Y2009**		**Y2014**	
	Male	**Female**	**Male**	**Female**
Currently attending	25.8%	23.6%	23.5%	21.7%
Attended in the past	70.7%	69.7%	73.4%	72.4%
Never attended	3.5%	6.7%	3.0%	5.8%
Total	100%	100%	100%	100%

Source: Vietnam Population and Housing Census, 2009, 2014 (GSO, 2011; GSO, 2015a)

In Vietnam, the share of the population aged over 5 years old who have never attended school has declined considerably since 1989, for example, 18 per cent in

1989 as compared to 4.4 per cent in 2014. In contrast, there has been an increasing proportion of the population aged over 5 years old who ever attended school in the past since - see Table 2.1. However, Table 2.2 depicts gender differences in school attendance. More females than males in the population aged over 5 years old have never attended school, for instance, 6.7 compared to 3.5 per cent in 2009, and 5.8 compared to 3 per cent in 2014. The gender differential is explained mostly by a moderate gap in older aged group rather than a gap in younger aged group, which indicates the historical disadvantages females have faced in terms of the benefits of schooling (GSO, 2011; GSO, 2015a). This gap has narrowed substantially in recent years in Vietnam (GSO, 2015a). The gender gap is even bigger in Cambodia, 28 per cent as compared to 18 per cent in 2008, and 24.6 compared to 15.3 per cent in 2013 (see Table 2.3).

Table 2.3: **School attendance status in population (6+ years old), Cambodia, by gender, 2008-2013**

School attendance status	**Y2008**		**Y2013**	
	Male	**Female**	**Male**	**Female**
Currently attending	31.4%	25.8%	28.3%	23.7%
Attended in the past	50.8%	46.2%	56.4%	51.7%
Never attended	17.9%	28.0%	15.3%	24.6%
Total	100%	100%	100%	100%

Source: Cambodia Inter-Censal Population Survey, 2013 (NIS, 2013)

In addition, Table 2.1 also illustrates the increasing rate of literacy in Vietnam, from 88 per cent in 1989 to 95 per cent in 2014. The Vietnamese literacy rate is much higher than that of Cambodia although Cambodia has also increased its rate of literacy over time, from approximately 63 per cent in 1998 to 80 per cent in 2013. There has also been a big improvement in female literacy, from around 55.5 per cent in 1998 to 74.8 per cent in 2013, which explains the convergence of the gender gap in literacy rates in Cambodia (see Table 2.4).

Table 2.4: **Literacy rate in population (over 6 years old), Cambodia, by gender, 1998-2013**

	Overall	Male	Female	Male-Female gap
Year 1998	62.8%	71.0%	55.4%	15.6%
Year 2004	74.4%	82.1%	67.4%	14.7%
Year 2008	78.4%	84.0%	73.1%	10.9%
Year 2013	79.8%	85.1%	74.8%	10.3%

Source: Cambodia Inter-Censal Population Survey, 2013 (NIS, 2013)

Table 2.5: **Net enrolment rates, Vietnam, by education levels, and residential areas, 2009-2014**

	Primary	Lower Secondary	Upper Secondary	Tertiary
Year 2009				
Urban	97.2%	88.8%	68.4%	36.2%
Rural	94.9%	80.6%	52.8%	6.7%
Total	95.5%	82.6%	56.7%	16.3%
Year 2014				
Urban	97.5%	91.8%	73.2%	n.a
Rural	96.4%	86.4%	59.2%	n.a
Total	96.8%	88.0%	63.1%	20.9%

Source: Vietnam Population and Housing Census, 2009-2014 (GSO, 2011; GSO, 2015a)

In terms of enrolment rates, Vietnam overall has achieved universal primary education and lower secondary education (see Table 2.5). Indeed, the net enrolment rate at primary education is, on average, high, for example, around 95 per cent in 2009 and 97 per cent in 2014, whislt these figures at lower secondary education are, on average, over 80 per cent, specifically, 83 per cent in 2009 and 88 per cent in 2014. However, the upper secondary enrolment rate is 25 percentage points lower than the lower secondary rate. Notably, the tertiary enrolment rate is lowest among education levels, for example, 16.3 per cent in 2009 and 20.9 per cent in 2014.

There is little difference in primary education enrolment rates between urban and rural areas. Nonetheless, the disparity in enrolment rates between urban and rural area is greater at higher education levels. For example, the gaps at lower

secondary education and upper secondary education were 5.6, 16.2 percentage points in 2009, and 3.6, 14 percentage points in 2014. This can be explained by the better living conditions and better open access to education in urban areas relative to rural areas because of the density of the school network and the better awareness of parents in the household towards the importance of education (GSO, 2011; GSO, 2015a).

The universal access to primary education in other Asian countries has similarly been achieved. Even Cambodia and Laos, which had the lowest starting point in education in the region at the start of 1990s, made dramatic progress in primary enrolment rates, for example, from 82 per cent in 2000 to approximately 97 per cent in 2011 in Cambodia and from 79 per cent in 2000 to around 90 per cent in 2011 in Laos (United Nations, 2013). Enrolment in secondary education has continued to increase in Asia, and there was, on average, an increase in the enrolment rate by 14 per cent to over 60 per cent between 1999 and 2011 (United Nations, 2013). The increase was even greater in Southeast Asian countries, with the net enrolment in secondary education rising from 48 per cent in 1999 to 65 per cent in 2011 (United Nations, 2013).

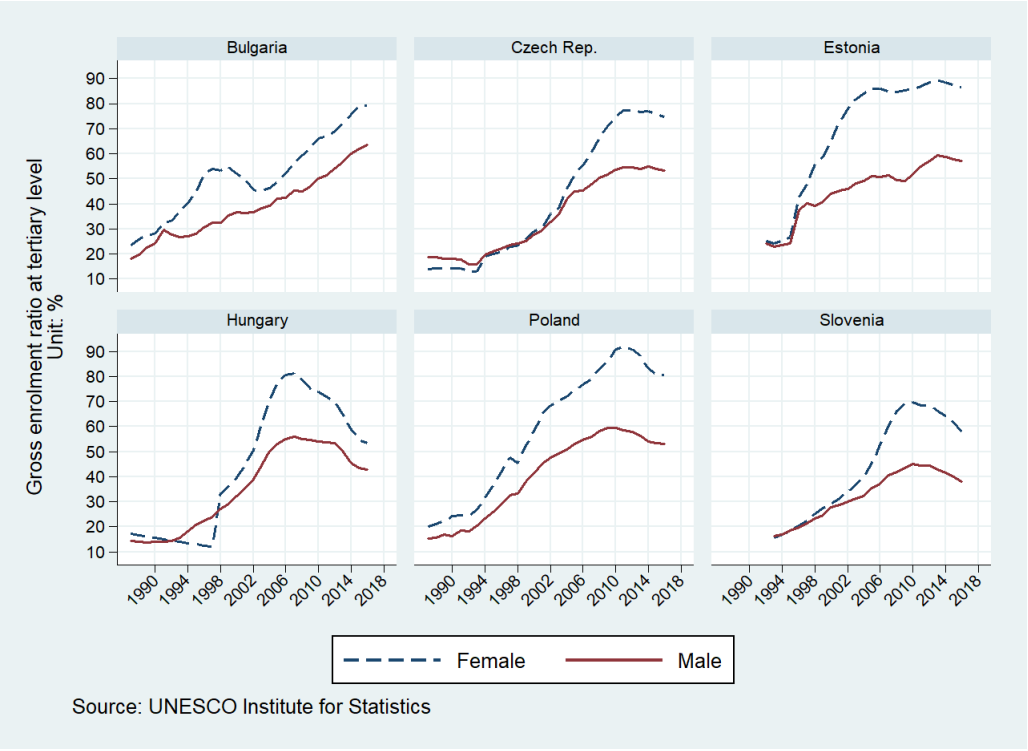

Figure 2-16: **Gross enrolment ratio at tertiary level in CEE countries, by gender, 1987-2018**

Turning to tertiary education, the enrolment rates in Asian countries are quite low, but have increased notably from 13 per cent in 1999 to over 26 per cent in 2011

(United Nations, 2013). Enrolment rates in tertiary education in CEE transition countries are higher than those in Asia countries. For example, CEE transition countries experienced increasing enrolment rates in tertiary education, from 34 per cent in 1990 to 43 per cent in 2000 and continue to rise up to 68 per cent in 2010 (UNESCO, 2015). Strikingly, in such transitional economies, the women's enrolment rates in tertiary education appear higher than that for men (see Figure 2-16). For example, in Bulgaria the gross enrolment rate in tertiary education for females was 5 percentage points higher than that of males in 1980s, but the reverse gap has been increasing since then, reaching to 16 percentage points in 2014 (76 per cent for females compared to 60 per cent for males). Similarly, in Czech Republic, females started to surpass males in enrolling in tertiary education in 2000s and this continues to rise, for example, 77 per cent for females enrolled as compared to 55 per cent for males in 2014.

Historically, the educational attainment level of the workforce is generally low in Vietnam but the workforce's education has been increasing over time (Phan & Coxhead, 2013; Tien, 2014) (see Table 2.6). This trend is also consistent with evidence from other transitional economies in the early stage of reforms (Newell & Reilly, 2001). The majority of the employed working-age population in Vietnam have no technical qualification, accounting for more than 80 per cent while the proportion of the workforce with college degrees or higher is relatively small, accounting for approximately 8 per cent.[4] In general, the Vietnamese labour force is low skilled (GSO, 2015b), and the labour force in urban areas, especially in two biggest cities such as Hanoi and Ho Chi Minh City, has much higher education attainment levels than those in rural areas. For example, more than 20 per cent of workers in Hanoi and 18 per cent of workers in Ho Chi Minh City achieved at least a bachelor degree.

In addition, there is also a gap in education between male and female workers (see Table 2.6). A larger proportion of female workers than that of male workers (80 per cent and 84 per cent in 2014) do not have college degrees or above. In particular, more female workers than male workers have no schooling, for example, 4.7 per cent as compared to 2.7 per cent in 2014 (see Table 2.7). The same pattern happens with two other categories, 'incomplete primary education' and 'complete primary education', for example, 12.7 per cent and 24.4 per cent as compared to 10

[4]No technical qualification refers to the unskilled group with education levels below upper secondary school. In particular, 'no technical qualification' group includes 5 different groups, namely 'No schooling', 'Incomplete primary school', 'Complete primary school', 'Complete lower secondary', and 'Complete upper secondary school'. Among these groups, workers with lower secondary school take the biggest proportion out of employed persons, accounting for 30.3 per cent in 2014 while a minor proportion of employed persons, accounting for 3.7 per cent in 2014, never attain school.

Table 2.6: **Employed population with technical training and qualifications, Vietnam, 2010-2014**

		No technical qualification	Vocational training	Professional secondary school	College	University and above
Year 2010						
Urban	Male	67.7	8.8	5.2	2.2	16.4
	Female	72	2.9	7.2	3.7	14.2
Rural	Male	90.2	4.4	2.8	0.9	2.1
	Female	92.8	3.1	2.8	1.5	1.6
Year 2011						
Urban	Male	65.9	9.9	4.8	2.1	17.3
	Female	70.4	3.4	7.1	4.0	15.1
Rural	Male	89.4	4.5	2.6	0.9	2.6
	Female	91.7	1.3	3.0	1.8	2.2
Year 2012						
Urban	Male	65.3	11.0	4.8	2.0	16.9
	Female	71.6	3.7	6.5	3.7	14.5
Rural	Male	88.4	5.3	2.6	1.1	2.6
	Female	91.5	1.5	2.9	1.9	2.1
Year 2013						
Urban	Male	62.8	12.5	4.8	2.2	17.7
	Female	70.1	4.1	6.5	3.9	15.4
Rural	Male	86.9	6.2	2.9	1.1	2.9
	Female	90.8	1.7	2.8	2.0	2.8
Year 2014						
Urban	Male	62.6	11.5	4.8	2.4	18.7
	Female	68.9	3.8	6.4	4.0	16.9
Rural	Male	87.0	5.7	2.8	1.2	3.3
	Female	90.7	1.4	2.8	2.0	3.0

Source: Labour Force Survey 2010, 2011, 2012, 2013, 2014 (GSO, 2013; GSO, 2014; GSO, 2015b)

Table 2.7: **Proportion of employed population by educational attainment, Vietnam, 2012-2014**

Educational attainment	Year 2012		Year 2013		Year 2014	
	Male	Female	Male	Female	Male	Female
Never attended	2.9%	5.1%	2.8%	4.9%	2.7%	4.7%
Incomplete primary	10.4%	13.0%	10.2%	13.1%	10.0%	12.7%
Completed primary	24.0%	25.4%	23.6%	25.0%	23.0%	24.4%
Completed lower secondary	30.8%	31.0%	30.6%	30.7%	30.4%	30.2%
Completed upper secondary	13.4%	11.1%	12.5%	10.9%	13.1%	11.9%
Technical qualification	18.6%	14.5%	20.3%	15.4%	20.4%	15.8%
Total	100%	100%	100%	100%	100%	100%

Source: Labour Force Survey 2012, 2013, 2014 (GSO, 2013; GSO, 2014; GSO, 2015b)

per cent and 23 per cent in 2014, respectively. With regards to higher education, more male workers obtain college or above degrees as compared to female workers - approximately 20 per cent as compared to 16 per cent of women workers.

Table 2.8: **Proportion of employed population by education attainment, Thailand, 2007-2010**

Educational attainment	Year 2007	Year 2009	Year 2010
No education	3.4%	3.0%	3.0%
Less than primary	32.0%	30.0%	28.4%
Completed primary	22.8%	22.6%	22.9%
Completed lower secondary	14.7%	15.4%	15.7%
Completed upper secondary	12.5%	13.3%	13.8%
Higher education level	14.2%	15.4%	15.9%
Other	0.1%	0.1%	0.1%
Unknown	0.4%	0.2%	0.2%
Total	100%	100%	100%

Source: Labour Force Survey, Thailand National Statistics Office NSO

Table 2.8 shows education attainment of the labour force in Thailand. The proportion of the employed population never attending school is small, standing at around 3 per cent, while the proportion of the employed population who have not completed primary school decreased from 32 per cent in 2007 to around 28 per cent in 2010. The share of employed population with elementary (i.e. primary school) appeared stable whilst there was a slight increase of approximately 1.3 per cent

of the employed population with secondary education (i.e. lower secondary and upper secondary). Workers with at least college and university degrees accounted for 14 per cent in 2007 and 16 per cent in 2010. However, there is no significant gender difference in the education attainment of the labour force over the past decade in Thailand (ILO, 2013).

In China, the proportion of the employed population with no schooling keeps decreasing, for example, from 4 per cent in 2004 to 1.5 per cent in 2012 for males, and from 8.5 per cent in 2004 to 3.5 per cent in 2012 for females. The proportion of the employed population with primary education fell from 25 per cent in 2004 to 16 per cent in 2012 for males, and from 30 per cent in 2004 to 23 per cent for females in 2012 (ILO, 2015b). There have been moderate increases in the employed population completing at least lower secondary school (ILO, 2015b). There is an increasing proportion of the employed population with higher education because ILO (2015b) notes that they have recently moved towards higher education levels.

2.6 Wage

The gender wage gap in transition economies has been the subject of much interest as a result of changes in the wage structure which have been associated with transition. These changes vary across countries and regions. For example, Brainerd (2000) shows that CEE countries, such as the Czech Republic, Hungary, Poland, and Slovakia, experienced increases in female relative wages whereas the female relative wages in Ukraine and Russia (CIS economies) decreased. This then led to an increase in wage inequality (Brainerd, 2000; Fong & Paull, 1993; Rutkowski, 2006) and placed increasing pressure on the gender pay gap since women were clustered at the bottom end of the wage distribution (Brainerd, 2000). However, Newell and Reilly (2001) found no substantial change in the gender wage gap during the first decade of transition.

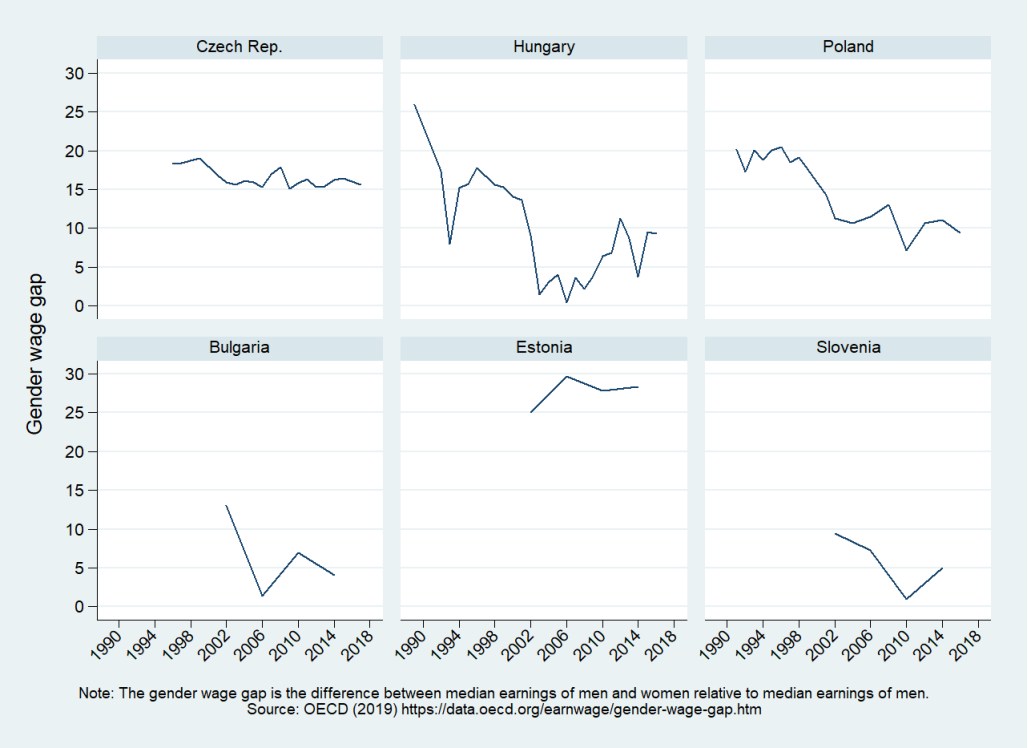

Figure 2-17: **Gender wage gap in CEE transition countries, 1990-2016**

Figure 2-17 illustrates the gender wage gap in CEE countries between 1990 and 2016. In general, there has been a narrowing of the gender wage gap in most of CEE countries. This is consistent with Razzu (2017) showing that Slovenia, Poland, and Bulgaria experienced a substantial reduction in the gender wage gap whereas Estonia and Czech Republic did not. For example, the gender wage gap shrunk significantly in Hungary since 1980s. Women wages were, on average, around 73 per cent of men wages in 1986 and rose to 84 per cent by 2014 (Fodor, 2017). Nonetheless, Estonia stands out among CEE countries for its high gender wage gap, which was, on average, estimated to be around 30 per cent. It is exceptional that the gender wage gap has risen in Estonia since the early 2000s (Voormann & Helemae, 2017).

Regarding Asian economies during the transition period, the trend in the evolution of the gender wage gap is mixed. For instance, in Thailand, female wages were, on average, around 35 per cent and 20 per cent lower than male wages in 1990 and 2000, respectively (ILO, 2008). In Vietnam, female wages were, on average, around 29 per cent and 18 per cent lower than male wages in 1992 and 2012, respectively (Liu, 2004a; Tran, 2015). On the contrary, China, for example, experienced an increase in the gender wage gap, with female wages around 17 per cent lower than male wages in 1990 and 30 per cent lower in 1999 (ILO, 2008). However, ILO (2013) argued that Vietnam is among a few countries in the world

where gender pay gap has been widening by 2 percentage points while the gap has declined in most nations in the period 2008-2011 compared to the previous period 1999-2007. Additionally, ILO (2015a) continues to support the increasing gender wage gap not only in Vietnam but also in India and Indonesia.

Wages are one of the most important motivating factors for employees. There are many elements affecting wages, for example the labour market, the working environment, and the characteristics of the job as well as the employees themselves. This creates the disparity in wage. There is a large body of literature that attempts to explain the gender wage gap (see Blau & Kahn, 2003; Blau & Kahn, 2017).

First of all, education is an important determinant of earnings because human capital corresponds to any stock of knowledge or characteristics that workers possess and which contributes to their productivity and marketable skills in the labour market. The higher the education level the workers obtain, the higher their initial wage and the steeper the subsequent earnings profile. In Vietnam, for example, Liu (2006), Pham and Reilly (2007), Doan (2011), Oostendorp and Doan (2013), all suggest greater returns correspond to higher levels of education, even though Vietnamese returns to education appear lower as compared to other developing countries and transition economies (Moock, Patrinos, & Venkataraman, 2003). The returns to education in Vietnam increased from 1993 to 1998 (Gallup, 2002), and continue to increase in the next period between 1998 to 2006 (Liu, 2006; Oostendorp & Doan, 2013; Pham & Reilly, 2007). The return to education for males appears lower than that for females (Moock et al., 2003; Tien, 2014).

As in developed countries, including the US, education is a vital element to the contraction of gender earning gap in Vietnam (Gallup, 2002; Liu, 2004a; Pham & Reilly, 2007), and in East Asian countries (ILO, 2008) because more women tend to pursue higher levels of education than men in the expectation of differences in the wage structure between skill group and unskilled group.[5] It is also in line with the study of Nakavachara (2010) for Thailand which found that the main factor contributing to the contraction of gender earning gap in Thailand's formal sector during 1985-2005 was primarily an improvement in female education.

Secondly, working experience and job tenure are other determinants of earnings. According to ILO (2008), there is a positive relationship between working experience and the pay rate in some occupational categories. This means that more senior workers are, more highly paid, which appears particularly evident in the public sector. For example, in the Vietnamese state sector, the wage of cadres and public employees are automatically increased every three years, which may be one

[5]Blau and Kahn (2017) show that human capital variables have become relatively less important in explaining the contraction of the gender wage gap in US overtime.

explanation for less inequality in the state sector wage. On the other hand, there is no link between working experience and pay in other types of work, usually at the lower levels of the job hierarchy (ILO, 2008). For example, within manufacturing a worker's years of working experience on the assembly line is not associated with productivity increases and thereby higher pay. In empirical studies, the inclusion of working experience may be problematic in Vietnamese studies since it is not reported in any surveys. As a result, the age of an individual is used as a proxy for labour market experience (Pham & Reilly, 2007) though it was acknowledged that this proxy cannot fully capture the effect of labour market experience on wages. Alternatively, Liu (2004a) suggests that the estimate of potential working experience can be measured as age minus years of schooling, and minus the enrolment age.

A third factor is the difference in working hours between males and females. In general, the most common range of working hours for both male and female workers in most OECD and Asian countries including Vietnam is around 40 hours or more per week (GSO, 2015b; ILO, 2008; OECD, 2018). For example, approximately 40 per cent of Vietnamese employees worked from 40 to 48 hours per week, and around 34 per cent of employees worked more than 48 hours in Vietnam (GSO, 2015b).[6] In the group working more than 48 hours, the proportion of male workers was greater than that of female workers (GSO, 2015b).[7] With regards to OECD countries, the distribution of the workforce across working hours is generally more even for females than for males because a large proportion of females are working part-time with fewer hours (OECD, 2018). In order to compare the equality in earning or pay, the hourly wage is generally used. However, unpaid work such as taking care of children, elderly members in the household, and doing unpaid household work, are in general carried out by women as society norms across the world (ILO, 2014). Females, on average, spend around triple time on unpaid work per day than males in the Asia Pacific region (ILO, 2014).

Occupational segregation is another factor explaining the gender wage gap (Blau & Kahn, 2000). The fact that women are constrained to work full-time causes women to have fewer incentives to invest in further education and training, and less job tenure, resulting in relatively lower earnings. This might also be a reason why employers may be reluctant to hire women for skilled jobs because of higher costs of such training and incomplete return on this investment. Although occupational segregation in the labour market may vary differently across coun-

[6]According to Vietnamese Labour Code 1992, working hours varies from 40 to 48 hours per week. The exceed hours is considered over time hours.

[7]Working hours refer to hours that employees work all kinds of job in a week to earn wage, salary and other kinds of income.

tries and regions, it is quite common for women to cluster in lower levels of the job hierarchy with lower pay ascompared to men, irrespective of individual abilities (ILO, 2008). For instance, females are likely to dominate in caring, cashiering, catering, cleaning and clerical jobs (ILO, 2008). In Vietnam specifically, there was a rise in occupational segregation with a movement of women out of industries traditionally dominated by men and into those in which women have been better represented since 1980s (Goodkind, 1995). There is a small percentage of women employed in industry, for example, 9.8 per cent in transportation and storage, 9.8 per cent in construction, in 2014 whereas a large proportion of women, accounting for 93 per cent, 71 per cent and 70 per cent in 2014, employ in domestic help, education and training, and hotels and restaurants, respectively (GSO, 2015b).

Historically, culture and stereotypes have influenced the gender gap. According to Jayachandran (2015), cultural factors such as patrilocality, old-age support from sons, dowry system, patrilineality roles of sons in religious rituals, and desire to protect female purity, together with a persistence of gender norms caused when changes of economic conditions occurred, might be a plausible explanation for the gender gap in developing countries. For example, after marriage, a woman ceases to be members of her birth family and joins her husband's family. Consequently, parents potentially reap more of the return to investments in a son's health and education because a daughter will physically and financially leave the household upon marriage, leading to absence in both terms of physics and finance. It is quite common manner in developing countries such as China, India, and also Vietnam. It is said that raising a daughter is "like watering your neighbours' garden". When parents get older, they may get old-age support from their sons in traditional societies, especially in rural China (Ebenstein & Leung, 2010). Furthermore, sons play a special role in certain belief systems such as Hinduism in India and Confucianism in China. However, the fact that Vietnamese culture is affected by Confucianism encourages the patrilineal and patrilocal system in Vietnam society. It is consistent with Meng (1996) which concluded that gender inequality resulted in social, political and cultural structures rather than economic development because the results showed that there was no significant relationship between economic development and female economic status including the relative earnings of females as compared to males.

The change of institutional frameworks during the transition period may also be a factor in explaining the gender pay gap (Dawn Metcalfe & Afanassieva, 2005; ILO, 2008). For example, the abolition of the centrally determined wage system in Vietnam, which restricted the degree of gender wage inequality in the past, now creates a potential for widening the gap (Liu, 2004a; Pham & Reilly, 2007). In

Vietnam, SOE restructuring had occurred roughly in parallel with other reforms such as price liberalisation and market deregulation. This led to a dramatic decrease in the level of employment in SOEs in the early 1990s shortly after the onset of Doi Moi. The closure of SOEs was accompanied by the creation of the private sector labour market. Consequently, employment in the private sector increased from 1990 to 1992, but it is offset by the decline of employment in state and cooperative. There was, therefore, little net increase in the labour force participation on this period (ILO, 1994). However, Liu (2004b) suggests that the downsizing of the SOE sector provided a potential channel to widen the gender pay gap because SOE provided workers with more secure jobs than private firms. Additionally, with the high inflation rate, wages remained frozen and in-kind bonuses were reduced. By 1991 the real wage of civil servants and public employees declined by over 60 per cent compared to 1985 (ILO, 1994). The situation improved in 1993 when the minimum wage was raised. The introduction of a formal labour contract system and wage reform in the 1994 Labour Code, which is based on the employer-employee relationship, eventually marked a milestone of advanced reforms for Vietnam during the transitional period.

In modern days, there are many factors affecting the gender wage and earnings gap. Key factors are economic growth, globalization and trade liberalisation. Theoretically, there are many channels, through which globalization may affect gender inequality in the labour market (Chen et al., 2013). For example, globalization provides more job opportunities for females who have a cheaper labour cost than men due to the dramatic increase in the number of women workers in foreign-invested and export-oriented sector in the open of international trade and foreign direct investment. Globalization also gives us more competitive pressure on employers, which then reduces gender inequality because in long run discriminatory firms cannot survive while non-discriminatory firms expand well. Other indirect effects of globalization on gender inequality are through economic growth, human capital investment in favour of women, and technological improvements. Now, we consider Vietnam as an illustration. The growth model embraced by Vietnam during the last two decades has prompted deep social economic transformation. The private sector has been thriving with the transition of a centrally planned economy towards a market-oriented economy since the Doi Moi where the state sector was downsizing. Economic growth has helped considerably to reduce poverty, but has increased social inequality, and created income gaps between public and private sector in the meantime (Imbert, 2012), and also between urban and rural areas (Nguyen, Albrecht, Vroman, & Westbrook, 2007). These inequalities are also evident in the labour market.

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Appendix 6B: Statement of Authorship

This declaration concerns the article entitled:			
Puzzle me this? The Vietnamese reverse gender education gap			
Publication status (tick one) **Draft manuscript** ☐ **Submitted** ☐ **In review** ☐ **Accepted** x **Published** ☐			
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Candidate's contribution to the paper (provide details, and also indicate as a percentage)	The considerably contributed to the following components of the research, according to the following percentages: Formulation of ideas: - Formulation of the research question (20%) - Collection and study of the relevant literature (50%) Design of methodology: (includes implementation): - Collection and gaining command of the data (including programming to generate analysis dataset) (95%) --Choice of relevant econometric model (50%) --Specification of models (50%) --Estimation of models (80%) --Evaluation of models (50%) Experimental work: N/A Presentation of data in journal format: --Writing of paper (including formulation of structure of paper) (35%)		
Statement from Candidate	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature.		
Signed	Van Phan	**Date**	30/8/2019

Last update: Feb 2019

Chapter 3

Puzzle me this? The Vietnamese reverse gender education gap

Thanos Mergoupis, Van Phan, John Sessions

Abstract

We investigate within the context of Vietnam how circumstances at age 15 or 16 relate to completion of upper secondary education four years later. We exploit the longitudinal elements of Vietnam Access to Resources Household Survey (VARHS) to identify household and commune characteristics and emphasise how the effects of these characteristics vary by gender. The gender differences we find suggest that unequal treatment of girls within their households has a negative impact on their educational attainment and that in the absence of such unequal treatment the reverse gender gap would be even larger.

Keywords: gender, education gap, Vietnam.
JEL classification: J31, J32, J33, M12

3.1 Introduction

Education sets Vietnam apart from other developing countries, especially in terms of its quality. As Dang and Glewwe (2018) show, PISA scores of 15-year-old students in Vietnam are substantially higher than scores from countries with a similar level of income per capita and compare favourably to scores of high income countries. Another feature of education in Vietnam that it shares with many high-income countries, but which has not received as much attention, is the reversal of the gender education attainment gap. As net enrolments in primary and lower secondary education are almost universal, this reverse gap emerges most dramatically at the upper secondary level. Using net enrolment rates in upper secondary education, the reversal of the gender education gap emerged around 2005 and reached about 10 percentage points by 2014 (Dang & Glewwe, 2018). In terms of upper secondary completion rates, however, the reversal emerged in the early 1990s, with women having 4 percentage points higher rates than men already by 1993 (Nguyen, 2004). To our best knowledge, there is no study on the completion rate

In the period 2012 to 2016, upper secondary completion rates by women aged 19-20 are estimated to be between 9.0 and 17.6 percentage points higher than men's, depending on the year and data source (see Table 3.2). We investigate the determinants of this gap using the Vietnam Access to Resources Household Survey (VARHS), a rich longitudinal survey that in addition to household includes commune level information. Our findings present us with a puzzle. We find little in terms of economic characteristics of the household and the community that can explain the gender gap. Indeed, we find that what matters for educational attainment at this level in fact works against females. This implies that the gap to be explained is in fact considerably larger than what appears in summary statistics, hence the puzzle.

The exact timing of the reversal varies depending on data source and measurement. Using net enrolment rates in upper secondary education, the reversal of the gender education gap emerged around 2005 and reached about 10 percentage points by 2014 (Dang & Glewwe, 2018). In terms of upper secondary completion rates, however, the reversal emerged in the early 1990s, with women having 4 percentage points higher rates than men already by 1993 (Nguyen, 2004).

Throughout this period Vietnam experienced rapid economic growth and significant advances in both male and female educational attainment. The longest and most up to date series of attainment are in Dang and Glewwe (2018). These show that net enrolments in 1992-1993 were 85.6 percent for primary, 72.3 percent for lower secondary and 27.2 percent for upper secondary. By 2014 these rates

had risen to 98.0 percent for primary, 94.8 percent for lower secondary and 72.5 percent for upper secondary. For the most part, however, these increases were achieved by 2004 with only marginal growth in the decade 2004-2014. During that decade, at the secondary level there were no major shifts except the widening gender gap in upper secondary attainment. The Dang and Glewwe (2018) series shows that after 2004, upper secondary enrolments for boys started declining while for girls kept increasing (with the exception of 2010), underscoring the reversal in the gender education gap. However, the study of Dang and Glewwe (2018) provides a basic decomposition of their secondary education variations into variations at different levels, including student, commune, and province levels by using both household survey data and national assessment data for students in grade five, but does not address the reverse gender education gap, especially at upper secondary level in Vietnam, especially in rural areas. Therefore, this paper is first to examine the reverse gender education gap at upper secondary level in rural Vietnam systematically. The additional contribution of this paper is to what extent the relationship between the local labour market conditions, which are derived from the commune questionnaires of VARHS and accompanied by the administrative dataset (i.e. Census 2009) may help to explain the reverse gender education gap in Vietnam.

Reversing the gender gap in education does not necessarily imply a reversal of the economic positions of men and women in the labour market, as education levels are not sufficient in and of themselves to reverse unequal treatment entrenched for decades, if not longer. Nevertheless, it would be reasonable to expect that shifts of such magnitude would be associated with improvements in the relative position of women in the labour market. It is unclear, however, whether this has happened in Vietnam. To our knowledge, there is no consistent data series on earnings by gender going back to the early 1990s. The data reported in Pham and Reilly (2007) show that the female to male ratio in hourly wage rates increased from 0.76 in 1993 to 0.88 in 1998, where it remained in 2002. More than ten years later, in 2012 and 2016, when the cohorts of women that were more educated than men were already at the early stages of their careers, the Labour Force Survey shows that the ratio of monthly earnings was only 2 percentage points higher, at 0.90 (GSO, 2013, 2017). At this level of aggregation then, there is no indication that the convergence and subsequent reversal of gender education gaps paid off for women in Vietnam. This is consistent with estimates of the conditional gender earnings gap showing no signs of decreasing during the same period (Doan, Le, & Tran, 2018; Oostendorp & Doan, 2013). From the perspective of this paper, these results show little discernible link between gender differences in returns and

enrolments. The absence of a link between labour market outcomes and education decisions is also reinforced by findings of other studies, which we discuss in Section 5.

The approach we take in this paper is to investigate how circumstances at age 15 or 16 relate to completion of upper secondary education four years later. We exploit the longitudinal elements of VARHS to identify household and commune characteristics and emphasise how the effects of these characteristics vary by gender. The gender differences we find suggest that unequal treatment of girls within their households has a negative impact on their educational attainment and that in the absence of such unequal treatment the reverse gender gap would be even larger. We find little in terms of local labour market conditions that could explain this gap.

The paper proceeds as follows. In the next section we discuss the various literatures that bear on the question of differential gender attainment. In Section 3 we discuss institutional context in Vietnam. The data and and method are discussed in Section 4 and 5, respectively. Section 6 discusses the results and Section 7 concludes.

3.2 Literature review

The human capital theory regards education an investment of time and forgone earnings for future pay (Mincer, 1958; Schultz, 1960). Positive returns to education become an incentive to make an investment in education as additional schooling generates benefits in terms of enhanced future earnings and results in direct costs and opportunity costs associated with delayed entry into the labour market. In making human capital investment decisions, parents consider whether the utility of taking a child to school exceeds the utility of keeping the child at home.

Within the framework of household production analysis, child's education attainment is viewed as a commodity desired by the household, which is produced with inputs of money income and parental time (Becker & Tomes, 1976; Mincer, 1958). The output is affected by parental ability to combine these resources for producing achievement. Therefore, additional parental inputs are expected to increase a child's achievement, ceteris paribus. However, these resources (i.e. time and money) are constraints for all families. In short, the amount of family resources allocated to children, the nature of these resources, and the timing of their distribution influences the attainments of children in the family. Children are also affected by choices made by parents regarding such things as the number of their siblings, the type of neighbourhood in which they grow up, and the number of

location moves and family structure changes (Haveman, Wolfe, et al., 1995).

There is a considerable literature on the determinants of educational attainment in Vietnam, but few studies examine attainment systematically from a gender perspective. In practice this means that, for the most part, all determining factors are constrained to be constant across males and females, and gender enters models as an intercept shifting dummy. The most comprehensive study to date, Dang and Glewwe (2018), examines various measures of education attainment for several years over the period 1993 to 2014, using the Vietnam Living Standards Survey (VLSS) and Vietnam Household Living Standards Survey (VHLSS). Particularly relevant to this paper are the results on secondary school enrolment among children aged 11-17, with secondary school including both lower and upper. The female indicator is estimated negative and significant for all years up to 2004, and positive and significant thereafter, hence following closely the pattern identified in the raw net enrolment series discussed above. When attainment is measured in years of schooling completed for individuals aged 15-25, gender differences disappear for most of the middle years of this period, possibly because the earlier cohorts with the more educated men are combined with the later cohorts with the more educated women.

The complement to the event of enrolling is the event of dropping out of school, so studies of the determinants of dropping out are also relevant to this paper. Of particular interest is the study by Coxhead and Shrestha (2017) because it estimates the probability of school attendance separately by gender and by rural and urban areas. Coxhead and Shrestha (2017) use the district level employment rate in foreign firms as a proxy for the opportunity cost of staying in school, as employment in such firms typically does not require and hence does not reward, upper secondary education. The estimated effects for 2009 vary both by gender and by rural vs. urban area. Increases in the employment rate of foreign firms have statistically significant negative effects in urban areas for both genders aged 15 to 19, with the effects for females about twice the size of the male effects. In rural areas, the effects are insignificant for males but negative and significant for females (though smaller than the effects on females in urban areas). If the employment rate in foreign firms captures the opportunity cost of attending upper secondary education, as Coxhead and Shrestha (2017) argue, then the picture that emerges from these results is of girls in their late teens being much more responsive to the labour market than boys. In rural areas in particular, boys are not responsive to labour market incentives at all. With employment in foreign firms growing at a rate between 3.0 and 3.5 per year in the period 2006 to 2012, the predicted gap in enrolment rates would be the exact opposite of what we observe, as girls would

tend to drop out and boys would tend to stay in school. The Coxhead and Shrestha (2017) results therefore reinforce the puzzle of the reverse gender gap.

Educational attainment depends on household resources and on the distribution of resources within the household, which in turn, at least in part, depend on fertility decisions. Various measures of resources have been found to be positively correlated with attainment in Anh, Knodel, Lam, and Friedman (1998); Behrman and Knowles (1999); Dang and Glewwe (2018), Le and Tran (2013), Menon, Van Der Meulen Rodgers, and Nguyen (2014), Dang and Rogers (2015) and Rolleston and Iyer (2019). Among these studies, Behrman and Knowles (1999) test for gender differences and find that female enrolment in 1996 was considerably more responsive to household income than male enrolment, implying that female schooling was treated as something of a luxury good. Le and Tran (2013) also find a negative association between a household asset index (i.e. whether the household owns some productive , including land, livestock, dwellings and consumer durables) or household consumption expenditure and the probability of school drop-out before lower secondary education completion though they did not address the gender difference in drop-out probability with regards to household resources. From a different perspective of household resources, evaluating the economic benefits of women's holdings of land-use rights is particularly important given many benefits of concentrating resources in the hands of women (Lundberg & Pollak, 1993; Menon et al., 2014). In particular, Menon et al. (2014) study the effect of the women's holdings of land-use rights on children education, and find that the land-use right held by female only or jointly, which reflects the women's empowerment in the household, raised children's school enrolment in Vietnam by using VHLSS.

Turning to the effects of the number of children, the estimates vary depending on how attainment is measured and the estimation method used. For 1994, Anh et al. (1998) find that family size is negatively correlated with attendance but not with completion of secondary education except for family sizes greater than six. Dang and Rogers (2015) instrument number of siblings using distance from family planning clinics and find that the effect on enrolment and completed years of schooling is statistically insignificant. In terms of gender effects, Tran and Nguyen (2014) find that the gender of the first born child matters for the attainment of subsequent children. Male first born children have a negative effect on both school enrolment and academic performance of subsequent children.

To the extent that an educational system maintains standards for grade completion, attainment should be positively correlated with effort and ability. Effort is difficult to observe but ability is typically measured using scores in aptitude tests. Rolleston and Iyer (2019) using data from the Vietnam Young Lives survey

find that maths scores in 2013 are positively correlated with grade 10 enrolment in 2016. They do not, however, test for gender differences.

In sum, estimates of the conditional gender gap in attainment confirm the reverse gender gap after 2006. The findings of those studies that test for gender differences reinforce the puzzle as, in contrast to boys, girls are found to respond to labour market conditions, and households tend to prefer investing to the education of boys rather than girls.

3.3 Vietnamese context

3.3.1 Educational development in Vietnam since Doi Moi

Once peace was achieved in the North of Vietnam after 1954, the Vietnamese government took over the education system, and actively prepared for a new education reform in the context of the fight for reunification of the whole country in 1975. The structure of the education system was revised significantly. For instance, the 12-year educational system in the South or Saigon Government-controlled areas and the 10-year educational system in the North were replaced by a new 12-year general education structure all over the country. This consists of three main levels, namely primary education with 5 years from 6-11 years old, lower secondary education with 4 years from 11-15 years old, and upper secondary education with 3 years from 15-18 years old.

A large set of economic reforms were implemented in Vietnam during the transition from a centrally-planned economy to a market economy, which is known as 'Doi Moi'. As a consequence of this change in the national policy, the education sector also needed to reform. Funding shortages were the biggest challenge faced by Vietnamese education in the 1980s following the collapse of the collective economy. The collection of tuition fees for public education at all levels (with the exception of primary public education), therefore, was allowed in 1989. Table 3.1 shows the fee structure for grades 6 to 12 in 1993, and the fees steadily increase through the grades and education level. Households were responsible for over two-thirds of education costs in 1993 - 67 per cent for lower secondary education, and 72 per cent for upper secondary education (Belanger & Liu, 2004). Thus, households with children in school age suffered the financial pressure of covering their children's education. The situation became more drastic for households in the poorest strata. These substantial household contributions to education costs in Vietnam are in stark contrast to the case of China where the government was still covering over 80 per cent of education cost in the early 1990s. As a result of the introduc-

tion of education fees in Vietnam, enrolment rates between the late 1988 and 1992 declined steadily before climbing back to pre-form levels in 1993 (Belanger & Liu, 2004).

Table 3.1: **Monthly official fee per student for Grades 6-12, 1993**

	Urban	**Rural**
Grade 6	3,000	2,000
Grade 7	4,000	3,000
Grade 8	5,000	4,000
Grade 9	6,000	5,000
Grade 10	7,000	5,000
Grade 11	8,000	6,000
Grade 12	9,000	7,000

Note: Unit is in Vietnamese Dong (VND)

Source: Government of Vietnam, cited in Bray (1996)

Another important change in the Vietnamese education was that private schooling has been permitted only since 1989. Although the share of private schooling was quite small in the early 1990s, it has been of increasing significance. The private schools have been subject to the same quality checks as public schools. For example, the quality of private primary schools is generally considered to be equal to or even higher than that in public schools; however, low-performing students are predominantly in private secondary schools (Rorris & Evans, 1994).

In addition, the main goal of the Vietnamese education reforms by the late 1980s was to increase the overall literacy of the whole country. Initially, the universalization of primary education for children, with the focus on those 6-14 years old was implemented in the early 1990s. As a consequence, the primary enrolment rate at the correct age has increased significantly, reaching at 96 per cent in 2006 and 99 per cent in 2014 (MoET, 2015), the drop-out rate fell considerably, from 3.33 per cent in 2005 to 0.12 per cent in 2012, and there is no gender difference in primary enrolment rate. Thus, Vietnam has successfully attained the goal of universalisation of primary education. The next reform was the universalisation of lower secondary education. In practice, the lower secondary enrolment rate increased drastically from 70 per cent in 2000 to 88 per cent in 2012 (MoET, 2015). However, the figure for boys is higher than that for girls, for example, 91.17 per cent for boys compared to 84.96 per cent for girls in 2012, which reflects that there have been some difficulties for girls in attending lower secondary education. In

conclusion, the universalisation of primary education at the correct-age and lower secondary education are the triumph of Vietnam education reforms.

Continuing these achievements, we have also seen several improvements at upper secondary level. In particular, the transition rate from the lower secondary to upper secondary level was approximately 70 per cent in 2005 and the net enrolment rate of upper secondary level at the right-age increased from 54 per cent in 2006 to 60 per cent in 2010, so the progress in upper secondary enrolment has been impressive (Le & Nguyen, 2016). However, the progress has differed widely across urban and rural regions, which is another problem of education inequality in Vietnam, since the higher education enrolment rates in urban and rural sectors are diverging (Le & Nguyen, 2016). In addition, the gender differences in enrolment arise in upper secondary where the overall enrolment rate in 2014 was 72.5 per cent with a reverse gender gap of about 10 percentage points. This gap arises mostly at the entry of upper secondary, as drop-out rates entry are small and with very small gender differences (e.g. 1.16 per cent for boys and 0.96 per cent for girls in 2009 MoET (2013)).

Enrolment is one of several measures of education attainment. From a labour market perspective it is perhaps more pertinent to measure attainment in terms of completion rates. We discuss completion rates in more detail below, but for now it is worth noting that the picture that emerges from completion rates is somewhat different from enrolment rates because in Vietnam many pupils repeat grades while others return to school after interrupting their studies. As a result, upper secondary completion rates are observed increasing with age even for those who are in their twenties. In addition, because males tend to have higher repetition rates than females (Nguyen, 2004), differences in enrolment rates may underestimate the magnitude of the reverse gender gap in attainment.

Another important feature of upper secondary education in Vietnam is the role of the private sector and private finance, which became prominent in the mid-1990s. Nguyen (2004) reports that between 1993 and 1998 the share of upper secondary enrolment in private or semi-public schools increased from 4.2 to 17.5 per cent while private financing increased from 60 to 67 per cent.

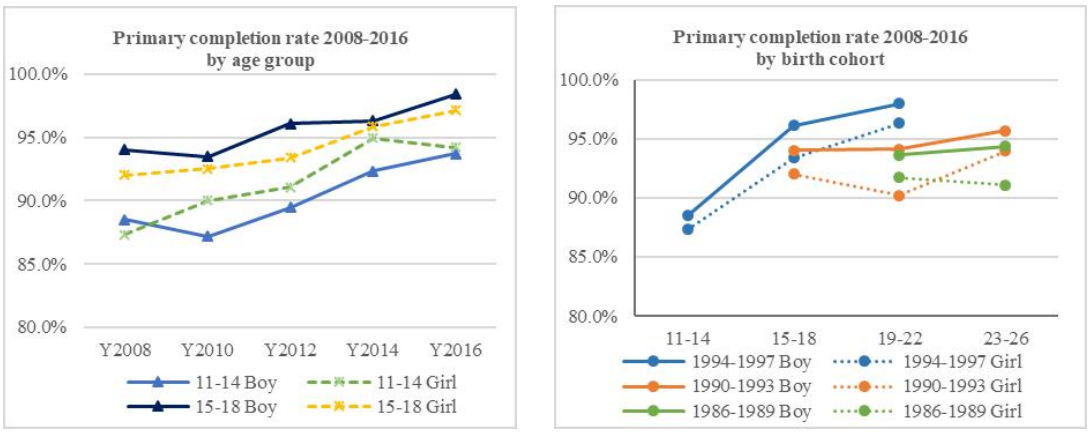
3.3.2 Background of educational attainments in rural Vietnam from 2008 to 2016

In this paper we use the five VARHS waves from 2008 to 2016, which include samples drawn from 12 provinces across Vietnam including Dak Lak, Dak Nong, Dien Bien, Ha Tay, Khanh Hoa, Lai Chau, Lam Dong, Lao Cai, Nghe An, Long

An, Phu Tho and Quang Nam, in order to analyse the completion rate.[1]

Figure 3-1 and Figure 3-2 illustrate the completion rates at primary and lower secondary level respectively by age group and birth cohorts. In general, the completion rates at primary and lower secondary in rural areas of Vietnam appear high. In terms of age group, the completion rate of a 11-14 aged group at primary level is, on average, over 85 per cent, reaching at 94 per cent in 2016. There has been a rise in completion rate of a 15-18 aged group at primary level. Similarly, at lower secondary level, the completion rate of a 19-22 aged group is higher than that of a 15-18 aged group. This suggests that the older age group have higher completion rates at schooling.

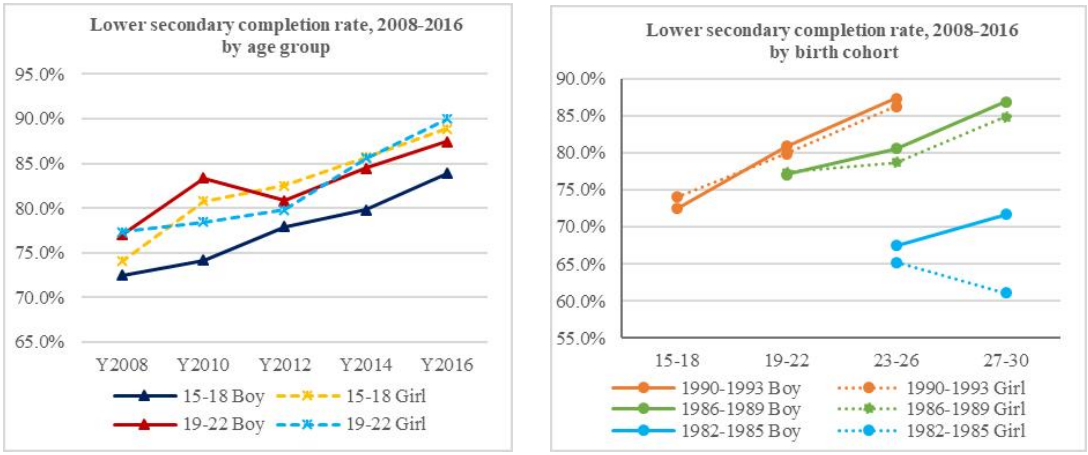
From a different viewpoint, we also see the increasing completion rate at primary level and lower secondary level in terms of birth cohorts (see Figure 3-1, and Figure 3-2). For those born in 1994-1997, for example, the completion rate at primary education increased by around 7 percentage points from 2008 to 2012, and continue to increase by 3 more percentage points in 2016 while the completion rate at lower secondary school increased from 80 per cent in 2012 to 88 per cent in 2016. For the 1990-1993 born cohort, there is a slight increase in the completion rate at primary education from 2008 to 2016 while there is a rise in completion rate in lower secondary level since 2008, particularly from 73 per cent in 2008 to 80 per cent in 2012, and continue to rise up to 87 per cent in 2016.



(a) Primary completion rate, by age group (b) Primary completion rate, by birth cohort

Figure 3-1: **Primary completion rate, by age group and by birth cohort**
Source: Author's calculations from VARH 2008-2016

[1]We are grateful to UNU-WIDER for providing access to the VARHS data and support the project on 'Structural transformation and inclusive growth in Viet Nam'.



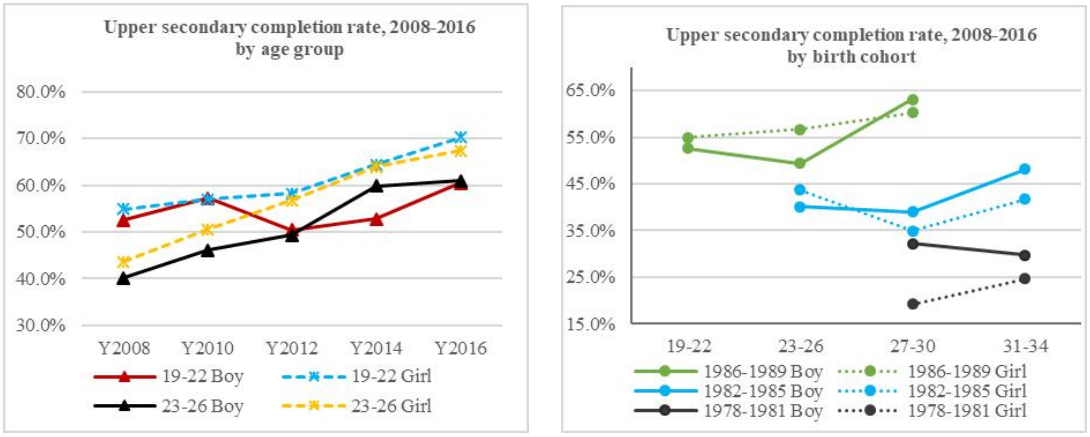
(a) Lower secondary completion rate, by age group

(b) Lower secondary completion rate, by birth cohort

Figure 3-2: **Lower secondary completion rate, by age group and by birth cohort**

Source: Authors' calculation from VARHS 2008-2016

In addition, there is little gender difference in completion rate at primary level thanks to the successful process of universalisation of primary at the national level. In terms of age group, the completion rates at primary level for girls, in general, seem slightly higher than that for boys in the younger group, whereas this is a reverse in the older group where the completion rate for boys at the primary level has been, on average, approximately 3 percentage points higher than that for girls since 2008. In terms of birth cohorts, we saw the increase of the primary completion rate of boys in birth cohorts of 1994-1997 and 1990-1993 which exceeds the increase of that of girls. In contrast to primary level, the gap in the completion rate between boys and girls emerges at the lower secondary level. In terms of age group, the gap at lower secondary level was around the same as primary level in 2008-2010, but then girls started outperform at lower secondary level. The gap has been in favour for girls since 2012, for example, 3 percentage points for a 19-22 aged group and 5 percentage points for a 15-18 aged group in 2016. In terms of birth cohorts, we saw the significant increase of the lower secondary completion rates of boys and girls in birth cohorts 1990-1993 and 1986-1989, but the gap seems minimal whilst there is a big gap in favour for boys in birth cohorts 1982-1985.



(a) Upper secondary completion rate, by age group

(b) Upper secondary completion rate, by birth cohort

Figure 3-3: **Upper secondary completion rate, by age group and by birth cohort**

Source: Author's calculation from VARHS 2008-2016

Turning to the upper secondary level, the completion rate is significantly lower as compared to that of two former levels, for example, 53 per cent in 2008 and 64 per cent in 2016 (see Figure 3-3). In terms of age group, there was nearly a parity in completion rate between males and females in 19-26 aged group in 2008 and 2010, but the gap favouring young females has started to diverge since then. Indeed, the gap seems quite large, in the region of 10 percentage points. At this level, there is a generation gap in education although this gap is getting smaller. The completion rate at upper secondary of the older group appears considerably lower than that of the younger group, for example, 42 per cent as compared to 53 per cent in 2008, and 64 per cent in 2016 as compared to 70 per cent in 2016. The gender differentials in the completion rate of the older group are, on average, smaller than that of the younger group.

In terms of birth cohorts, the gaps fluctuate a lot as these cohorts age. For the youngest cohort who were born between 1986-1989, the gap in favour of females in 2008 was estimated at 2 percentage points and 7 percentage points in 2012. However, we see a reversal after 4 years such that the gap switches in favour of males in 2016 as the cohort ages (see Figure 3-3). For the cohort born between 1982-1985, the gap favoured females in 2008, but then favoured males in 2012 and 2016. In general, we see that the completion rate keeps increasing regardless of age. Even between the ages of 27-30 and 31-34, there appear to be increases in completion rate over time. This implies on-going general schooling even at these ages because they may return to school after interrupting their studies. Most spectacularly, the completion rate of females born between 1982-1985 drops considerably from 43.7

per cent to 34.9 per cent as measured in 2008 and 2012. In short, the educational attainment in rural area has been improved noticeably, especially at upper secondary level. However, this section illustrates briefly the trend of rural education in Vietnam by descriptive statistics. To know more about to what extent of upper secondary education has been improved, the following section presents a model of determinants of the probability of an individual completing upper secondary education.

3.4 Data analysis

3.4.1 Data

This paper exploits a longitudinal survey VARHS, which was first designed in 2001-02, and then has been conducted bi-annually. The first 2002 VARHS pilot was focused on the rural areas of 4 provinces, namely Ha Tay, Long An, Phu Tho, and Quang Nam. Then, in 2006, the sample size increased to slight over 2,300 rural households living in 12 different provinces, including Dak Lak, Dak Nong, Dien Bien, Ha Tay, Khanh Hoa, Lai Chau, Lam Dong, Lao Cai, Long An, Nghe An, Phu Tho, and Quang Nam. And the 2008, and 2010 survey rounds, were expanded in number of new households interviewed in order to ensure the better representativeness of the rural population in the surveyed provinces (Tarp, 2017). VARHS also includes a commune-level survey. Interviews with commune administrators were performed in all communes where the VARHS households reside, providing information on demographics, infrastructure, and local economic conditions. In addition, the merit of the longitudinal survey VARHS is to establish the panel dataset. In fact, our analysis explores the reversal education gap by exploit VARHS waves from 2008 to 2016.[2]

In particular, our analysis uses the cohorts becoming 19-20 years old in the period from 2012 to 2016 in a longitudinal survey VARHS, so that from the 2012 wave we select those born in 1992-93, from the 2014 wave we select those born in 1994-95, and from the 2016 wave we select those born in 1996-97.[3] Using their household identifiers, gender, year of birth, and relationship to head of household, we can trace back to identify the same individuals in a wave four years earlier and

[2]The VARHS 2008, 2010, 2012, 2014, 2016 are provided by UNU-WIDER.

[3]In Vietnam, young children start primary schooling at the age of 6 or 7. The age when they can complete upper secondary education (i.e. finishing the grade 12) is around 18-19. Additionally, it is not uncommon in Vietnam for young adults in their 20s to enrol in upper secondary education. This implies that upper secondary completion rates increase as a cohort ages. We do not extend the analysis beyond the age of 20 because attrition rates in VARHS increase sharply after that age, with substantial gender differences.

extract their education at lower secondary, household, and commune characteristics four year earlier which we use to predict their educational attainment four years later. For example, for the cohort born in 1992-93 from the 2012 wave, we use household and commune characteristics from the 2008 wave (i.e. four years earlier) to predict educational attainment at upper secondary level derived from the 2012 wave. This gives us a sample of 1,001 observations, with 52.7 per cent of male.

3.4.2 Data analysis

Table 3.2: **Completion rates of 19-20 year olds, by survey and urban vs. rural**

	Male	**Female**	**Male-Female gap**
VHLSS 2014 - (At least) Upper Secondary			
All	51.6%	66.2%	-14.6%
Urban	67.1%	79.1%	-12.0%
Rural	46.5%	61.4%	-14.9%
VHLSS 2012 - (At least) Upper Secondary			
All	51.6%	60.6%	-9.0%
Urban	70.7%	77.3%	-6.6%
Rural	45.1%	54.8%	-9.7%
VARHS 2012, 2014, 2016			
(At least) Upper Secondary	53.4%	71.0%	-17.6%
Lower Secondary Only	30.3%	16.9%	13.4%
Primary Only	13.1%	7.6%	5.5%
Not Completed Upper Secondary and Attending School	6.4%	4.0%	2.4%

Notes: Sample sizes: VHLSS 2014: 1,181 observations (598 females & 583 males)
VHLSS 2012: 1,461 observations (725 females & 736 males)
VARHS : 1,001 observations (473 females & 528 males)

Source: Authors' calculations from VHLSS 2012, 2014, and VARHS 2012, 2014, 2016

Table 3.2 presents completion rates for 19 and 20 year olds derived from different surveys and for different population segments. The top two panels present upper secondary completion rates for urban and rural areas and the national level, derived from the 2012 and 2014 Vietnam Household Living Standards Survey (VHLSS). These can be compared with the top row of the third panel, presenting the upper secondary completion rates from VARHS (our sample). The estimates for men from the two VHLSS panels are close to each other, and the VARHS estimate is close to the national average from VHLSS. The estimates for women however, both

across VHLSS years and across surveys, vary considerably. It is not clear why this variation arises for women and not for men. The gender gap in upper secondary derived from the VARHS sample stands at –17.6 percent, substantially higher than the gaps from the 2012 VHLSS, but only about 3 percentage points higher than the national and rural gaps from the 2014 VHLSS. So in terms of magnitude, the gap we analyse in this paper is on the high end but not far off the national level.

Given that in Vietnam upper secondary completion rates rise with age well into the 20s, the question arises as to whether a gap defined as of age 19-20 may be temporary, and perhaps completion rates will converge as our cohorts age. The bottom row of Table 3.2 shows the percentages of men and women aged 19 and 20 who have not completed upper secondary but are still in school. Although at 6.4 percent for men and 4.0 percent for women these percentages are sizeable, even if all of those studying went on to complete upper secondary, the gap would be reduced by only 2.4 points. Therefore some convergence may be likely, but not at a rate that will substantially reduce the reverse attainment gap.

Alternatively, we can track back the cohort aged 19-20 in the wave 2012, 2014, and 2016 to identify the lower secondary completion at 4 years earlier (i.e. in 2008, 2010, and 2012), the upper secondary enrolment conditional on having lower secondary education at 4 years earlier (i.e. in 2008, 2010, and 2012), and the upper secondary completion conditional on upper secondary enrolment in the wave 2012, 2014, and 2016. These figures are shown in table 3.3.

Table 3.3: **Conditional enrolment rate and completion rate, 19-20 year olds**

	Male	**Female**	**Male-Female gap**
Lower secondary completion (4 years earlier)	71.2%	80.5%	-9.3%
Upper secondary enrolment (4 years earlier) (conditional on lower secondary completion)	88.9%	92.6%	-3.7%
Upper secondary completion (conditional on upper secondary enrolment)	71.6%	87.3%	-15.7%

Source: Authors' calculations from VARHS 2008, 2010, 2012, 2014, 2016.

The lower secondary completion rate of females at 4 years earlier was 9.3 percentage points higher than that of males at 4 years earliers. The gender difference in the conditional enrolment rate at upper secondary level at that time was quite small, around 3.7 percentage points. However, conditional on upper secondary enrolment, the upper secondary completion rate of females are much higher than

that of males, 87.3 per cent compared to 71.6 per cent. This leaves the gender gap in the conditional upper secondary completion rates as big as the gender gap in the unconditional upper secondary completion rates shown in 3.2 (e.g. 15.7% compared to 17.6%). Thus, the upper secondary completion rate conditional on the upper secondary enrolment can be used as a robust check instead.

Table 3.4 presents summary statistics of the variables used in our estimation, by gender. Educational attainment depends on household resources and on the distribution of resources within the household, which in turn, at least in part, depend on fertility decisions. It is widely recognised that, on average, children from poorer backgrounds have worse educational outcomes than their better-off peers (Blanden & Gregg, 2004). Household resources are measured as household income, and household land area. Gender differences in means across gender are generally small and not significant, except the land-use certificate (LUC) held by men and women jointly and the land-use held by mother. However, their differences between 2 groups seems marginal.

Another factor of educational attainment is parental education. Probably the most prominent and direct explanation of the link between parents' education and their children's academic achievements relies on the assumption that education provides parents with skills, perception and knowledge, which, in turn, influences the ways in which they interact with their children around learning activities (see Eccles, 2005). Thus, parents with more education have higher expectations for their children's education, which, in turn, predicts greater educational attainment for their children. In this study, parents' education is measured separately for mothers and fathers by dummy variables corresponding educational levels such as primary, lower secondary, upper secondary education. As expected, there is no gender difference in parental education of boys and girls.

Ethnicity of the family is also one of the elements affecting children's education attainment (see Glewwe, 2004; Le & Nguyen, 2016). Minority groups face disadvantages in accessing education because they are likely to live in remote areas where there is limited access to education.

Next, better access to education at the commune level helps children to stay at school and finish education. Thus, whether there is any upper secondary school in commune at the beginning years of upper secondary education (i.e. 15-16 years old) is the best illustration. This creates an incentive for the local young people to study because it is convenient and easy to get to school. In rural Vietnam, there is no schools at the very remote communes, which may restrict them for schooling. Despite the heterogeneity in the availability of high schools at the commune level, young people may still go to other school in neighbouring areas.

This, however, lessens the incentive for schooling. In addition, the higher levels of education beyond the lower secondary level are no longer compulsory, so that students and family can opt to do this, therefore, the drop-out rates at this level starts increasing, and higher than these lower level.

There is a trade-off between between the quantity and the quality of children (Becker & Tomes, 1976) because parental resources are finite, and as the number of children in the family increase, the resources accrued to any one child necessarily decline. Therefore, earlier literature often shows a negative relationship between the number of children and their educational attainment (Anh et al., 1998; Booth & Kee, 2009). Therefore, we extract the birth order of boys and girls within the household in this study.

In addition, our study try to explore whether local labour market conditions at commune level and expectations of economic returns at province level may help to explain the reversal gender education gap.[4] In details, the local economic conditions are captured by two proxies: (i) daily harvesting wage at the commune level 4 years earlier, as reported by the commune representatives, are gender-specific, and (ii) communal distance to the nearest big city. The male daily harvesting wage at the commune level is, on average, higher than the female daily harvesting wage at the commune level. Next, the communal distance to the nearest big city is the distance from the commune to the nearest city among these 5 municipalities, including Ha Noi, Hai Phong, Da Nang, Ho Chi Minh City and Can Tho.[5] The distance from the commune to its nearest big city may reflect the openness of the local communes to these big cities where people might migrate to have a lot of better opportunities in terms of education, job seeking and commerce.

In addition, expectations of economic returns may affect the education attainment, thus, we construct two variables: (i) wage/ salaried employment rate ratio by education, and (ii) median household income ratio by education. In fact, it is common in Vietnam that more educated individuals may be attracted towards wage salaried employment which provides more secure jobs with higher pay rather than involuntary self-employment. Therefore, the wage salaried employment rate for those who completed only lower secondary education is, on average, lower than that for those who achieved upper secondary education. The ratio between

[4]The detail summary statistics of these variables by commune or province level are shown in Appendix.

[5]According to Resolution 1211/2016/UBTVQH13 dated 25/5/2016, there are 5 municipalities, namely Ha Noi, Hai Phong, Da Nang, Ho Chi Minh City, and Can Tho.

In terms of distance, among 12 provinces in VARHS, Ha Tay, Lao Cai, Phu Tho, Lai Chau, Dien Bien, Nghe An, any communes of which are closest to Ha Noi whilst any communes of Quang Nam, and Khanh Hoa are closest to Da Nang, and any communes of Dak Lak, Dak Nong, Lam Dong, and Long An are closest to Ho Chi Minh City.

Table 3.4: **Summary Statistics**

	Male		**Female**		**Difference**
	Mean	**Std.Dev.**	**Mean**	**Std.Dev.**	**Mean$_M$ - Mean$_F$**
	(1)	(2)	(3)	(4)	(5)
Log of household income	10.486	1.272	10.444	1.475	0.041
Log of area of lands with LUC	0.066	0.034	0.067	0.031	-0.001
LUC held by men only	0.631	0.483	0.603	0.490	0.028
LUC held by women only	0.083	0.277	0.095	0.294	-0.012
LUC held by men and women jointly	0.117	0.322	0.159	0.366	-0.041*
LUC held by mother	0.157	0.364	0.150	0.358	0.007*
Father's education (Default: no primary)					
(At least) upper secondary	0.157	0.364	0.150	0.358	0.007
Lower secondary	0.331	0.471	0.332	0.471	-0.000
Primary	0.229	0.421	0.233	0.423	-0.003
Missing	0.076	0.265	0.104	0.305	-0.028
Mother's education (Default: no primary)					
(At least) upper secondary	0.104	0.306	0.116	0.321	-0.012
Lower secondary	0.318	0.466	0.304	0.460	0.014
Primary	0.278	0.449	0.302	0.460	-0.024
Missing	0.017	0.130	0.021	0.144	-0.004
Ethnicity - Kinh group	0.691	0.462	0.734	0.443	-0.042
High school in commune when 15-16	0.223	0.417	0.216	0.412	0.008
Birth order (Default: first-born)					
Second-born	0.373	0.484	0.355	0.479	0.018
Third-born	0.155	0.363	0.184	0.388	-0.029
Later-born	0.081	0.274	0.101	0.302	-0.020
VARHS waves (Default: 2012)					
2014	0.318	0.466	0.323	0.468	-0.005
2016	0.316	0.465	0.328	0.470	-0.011
Number of observations	528		473		1,001

Note: Column (5) shows mean difference between male and female
*, **, and *** denote significance for t-tests of mean equality of two groups at 10%, 5%, and 1%, respectively.
Missing values of parental education are dropped.

Source: Authors' calculations using VARHS 2008-2016.

the wage salaried employment rate for those who completed only lower secondary education and the wage salaried employment rate for those who achieved upper secondary education is derived from Vietnam 2009 Census in order to estimate the expectations of economic returns of achieving upper secondary education.[6] This ratio, as reported by district representatives, are gender-specific. We observe that these figures for females is, on average, much higher than those for males over 12 provinces. This reflects that more females than males in wage salaried employment complete upper secondary education. Alternatively, expectations about marriage may explain the gender education gap reversal since marriage-market distortions tend to depress the overall benefit of education for women relative to men (Parro, 2012; Reijnders, 2018). One proxy that we use to identify the role of marriage is the median household income ratio by education 4 years previous derived from VARHS. This ratio, as reported by district representatives, is calculated by taking

[6]The Vietnam 2009 Census is provided by IPUMS.

the median income of household with female in 25-45 years old completing upper secondary education divided by the median income of household with female in the same bracket age range completing only lower secondary.

3.5 Methodology

Our aim is to identify the main characteristics of a household and the local economy that correlate with the completion of upper secondary education for males and females. As mentioned earlier, because dropping out conditional on entry is very small and with negligible gender differences, the crucial point for upper secondary completion is that of entry. Age at the point of entry into upper secondary education in Vietnam varies significantly. This variation arises for various reasons. We have already mentioned grade repetition and study interruption. Another reason is that age also varies at the entry points in earlier schooling stages, including primary Nguyen (2004). Furthermore, because the timing of entry into upper secondary is itself correlated with household and local economy characteristics, it is impossible to choose entry points without an element of sample self-selection. The choice of measuring completion rates at age 19 to 20, and measuring household and local economy characteristics at age 15 and 16 implies we allow for one year of possible delays upon entry to upper secondary due to earlier delay of entry, repetition, or interruption of studies, and at the same time allow an extra year for completion of upper secondary. Still, as Table 3.2 shows, there is a sizeable proportion of those who have not completed upper secondary by 19-20 who are still in school, so we check the robustness of our conclusions by modifying our dependent variable to model completion or enrolment instead of completion only.

Our approach is to try to control for observable factors that may determine enrolment and subsequent completion of upper secondary, subject to data constraints. Although we control for a number personal, household, and local characteristics, we have no measure of personal ability or scholastic aptitude.

This study presents linear probability models (LPMs) level as follow

$$Pr(HighSch = 1) = X\beta^{'} + t\varphi^{'} + \varepsilon_{it} \tag{3.1}$$

$$Pr(HighSch = 1) = X\beta^{'} + BirOrd\gamma^{'} + t\varphi^{'} + \varepsilon_{it} \tag{3.2}$$

$$Pr(HighSch = 1) = X\beta^{'} + BirOrd\gamma^{'} + LabMkt\delta^{'} + t\varphi^{'} + \varepsilon_{it} \tag{3.3}$$

In which, $HighSch$ is a binary variable whether one young person completes the upper secondary school, X is a vector of individual, household and commune char-

acteristics, $BirOrd$ is a set of variables to capture family composition, $LabMkt$ is a set of local labour market conditions at commune level and expected economic returns at district level, t is a set of wave dummies, and ε_{it} is a disturbance term with zero mean and constant variance. The models are run separately for both groups, young males, and young females.

One advantage of the linear probability model is that its coefficients are easy to interpret. In fact, the effect of one-unit change in one control variable, other things being held constant, on the probability of completing upper secondary. However, the predicted probabilities using the linear probability model can be outside the positive unit. Logit model, therefore, can be used as its predicted probabilities are bounded between 0 and 1. Thus, the logit model can be run as a robust check for the linear probability model.

3.6 Results and discussion

3.6.1 Main results

Table 3.5 presents baseline results from estimating the probability of completing upper secondary education by age 19-20 using linear probability models, separately by gender. Estimation using probits yielded very similar results. All controls are measured as of 4 years earlier, i.e. at age 15-16. Model 1 shown in columns 1-2 does not control for parent education and birth order effects while model 2 shown in column 4-5 does.

Surprisingly, net household income has very small effects that are not significant for either gender in model 2. This is contrary to findings of previous studies which, however, are not directly comparable to ours because they measure household resources contemporaneously with educational attainment. Measuring household resources contemporaneously with the educational attainment of an adult may imply a simultaneity problem. Family resources may be higher because of individuals with higher education attainment. Our approach avoids this potential problem as resources are measured 4 years earlier. Nevertheless, given the importance of private financing at the upper secondary level, it is surprising that net family income does not marginally matter even in the absence of controls for parent education, as shown in columns 1 and 2. One possible reason for this may be that there tends to be much more variability in income than in expenditure or wealth measures. However, when we use the area of lands with land-used certificate (LUC) that the household owned 4 years earlier (i.e. at the age 15-16) as another measurement of household wealth, there is no significant association between household land

area and the upper secondary completion rate, which is illustrated in model 3-6. This suggests that the children completion rate at upper secondary level does not correlate with the household economic resources. This seems consistent with Le and Tran (2013) which find the insignificant effect of household consumption expenditure with respect to going to upper secondary school or even to vocational training. On the contrary, Le and Tran (2013) find the significant of the effect of higher household consumption per capita on keeping children stay in school and complete lower secondary education.

Based on the literature, parental characteristics, particularly parental education, is a potential determinant of the children education. In this study, parental education effects are large, with some variation by gender. Higher levels of parents' education are associated with higher completion rates for males and females (except relative to no primary education). In particular, on the father's side, father's education has stronger positive effects for boys, but not for girls. For example, the father's upper secondary education is associated with the increase of upper secondary completion rate for boys of 36 percentage points, other things being equal. The estimated effect of the father's upper secondary education is statistically significant different by gender, which is shown in column 6 in Table 3.5. On the other hand, mother's education has strong positive effects for both boys and girls. The estimated effects are very similar by gender with the exception of the effect of lower secondary education, which is, for instance, 18 percentage points for boys and 39 percentage points for girls (illustrated in column 4 and 5 in Table 3.5), a difference that is marginal statistically significant. In general, girls seem to receive unequal treatments within the household. Therefore, it is necessary to support that parent treat daughters and sons equally and invest in their education equally, which would be a foundation for them to have better and equal education.

Table 3.5: **Probability of upper secondary completion, by gender - LPM - Model 1, 2**

	Model 1			Model 2		
	Male	**Female**	**Dif.**	**Male**	**Female**	**Dif.**
	(1)	(2)	(3)	(4)	(5)	(6)
Log of household income	0.021	0.025*		0.007	0.019	
	(0.017)	(0.014)		(0.015)	(0.015)	
Father's education (Default: no education)						
(At least) upper secondary	-	-	-	0.355***	0.139	++
				(0.087)	(0.100)	
Lower secondary	-	-	-	0.257***	0.147	
				(0.080)	(0.097)	
Primary	-	-	-	0.202***	0.158*	
				(0.076)	(0.092)	
Mother's education (Default: no education)						
(At least) upper secondary	-	-	-	0.397***	0.436***	
				(0.089)	(0.103)	
Lower secondary	-	-	-	0.182**	0.391***	+
				(0.085)	(0.096)	
Primary	-	-	-	0.145*	0.248***	
				(0.074)	(0.093)	
Ethnicity - Kinh group	0.528***	0.306***	++	0.259***	0.067	+
	(0.066)	(0.072)		(0.080)	(0.073)	
Upper secondary school in commune	0.130***	0.077		0.131***	0.051	
	(0.047)	(0.048)		(0.043)	(0.044)	
Birth order (Default: first-born)						
Second-born	-	-	-	0.022	-0.071*	
				(0.045)	(0.042)	
Third-born	-	-	-	-0.050	-0.100*	
				(0.056)	(0.053)	
Later-born	-	-	-	-0.134*	-0.149*	
				(0.079)	(0.078)	
Observation	482	420		482	420	
R-squared	0.237	0.241		0.339	0.357	

Note: Constant, province and wave dummies are included. Robust standard errors are reported in parenthesis.

*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Gender difference denotes the significance level of gender interactions in a pooled model.

Source: Author's calculations using VARHS 2008-2016

Gender differences are also significant in the regional effects. Males in the northern provinces are significantly more likely than males in other provinces to complete upper secondary education whereas this does not happen to females. This is con-

sistent with Guilmoto (2012) who shows sharp differentiations between North and the rest of the country in terms of son preference practices. For example, northern provinces have the highest sex ratios (i.e. boy to girl) for children below one year of age and the highest son preference in fertility progression. Northern provinces are also differentiated from southern provinces in terms of practices of parents living with their married children. In all provinces it is more common for parents to reside with married sons rather than daughters, but this practice is exceptionally prevalent in all the northern provinces. With such practices prevalent, it is rational to invest in the education of male children because the male children act as insurance policy for old age. Ethnicity effects overlap with regional effects because of the uneven ethnic distribution across provinces. The Kinh and other ethnic groups with patrilocal and patrilineal practices are more heavily concentrated in the North, while groups like the Chăm and Raglay who practice matrilineal succession and the Khmer who practice bilateral succession are more concentrated in the South (Hoang, 2013). Our results show that males in households with head of household from the Kinh group are significantly more likely than males with head of household from other ethnic group and females nationally, to complete upper secondary education.

In addition, the presence of any upper secondary schools in the commune is positively significantly correlated with the completion rate for boys but not for girls. For instance, the presence of upper secondary school in the commune, other things being equal, is associated with an increase of completion rate of 13 percentage points for boys. In Vietnam, due to the fact that primary and lower secondary education are compulsory for students in order to increase the literacy of the nation, there have been a lot of supports and policies to encourage students to go to school and complete these two levels as mentioned in the section 3 above. However, the higher levels of education beyond the lower secondary level are no longer compulsory, so that students and family can opt to do this, and the presence of upper secondary schools at commune level, thereby, may not exist. Consequently, when they choose to continue their study, students can generally go to any schools in neighbouring communes regardless of the heterogeneity of schooling in their residential commune. This may be a demotivation for them to complete upper secondary school due to a long distance to school. Nonetheless, there is no significant gender difference in the estimated effect of the presence of upper secondary school at the commune level.

Gender differences are also present in birth order effects, though not statistically significant. Children that are not first born tend to have lower probabilities of completing upper secondary, but for males these effects are small and not sta-

tistically significant. For females on the other hand all the effects are negative and marginally statistically significant and increase in absolute value as the order increases, suggesting that female children are disadvantaged within households. As a consequence, household investment should be equally distributed to boys and girls regardless of the birth order. Alternatively, the number of births within the household should be focused to ensure the sufficient amount of investment in their education, especially for these later-born.

Additionally, we also address the effect of land and land ownership on education attainment in model 3 and 4 (shown in Table 3.6) since evaluating the economic benefits of women's holdings of land-use rights is particularly important given the emphasis in scholarly and policy discourse on many benefits of concentrating resources in the hands of women (Lundberg & Pollak, 1993; Menon et al., 2014). As suggested in Menon et al. (2014) , this study also controls for land-use certificate held by male only, by female only and held jointly in model 3. The result shows that female-only held land-use rights increase the probability of young males completing upper secondary, but not significant for both genders. This is in contrast to Menon et al. (2014) which showed that land-use right held by female only or jointly raised children's school enrolment. Even more specifically, we try to identify the effect of the land-use rights of their mother on the completion rate, but there is no statistically significant effect, which is illustrated in model 4.

In terms of commune level characteristics, it is unsurprising, though in Glewwe (2004) distance of primary and lower secondary schools did not matter for enrolment. More surprising is that there is no correlation between wages and upper secondary completion. VARHS includes information on four daily wage rates at the commune level by gender: wages for harvesting, ploughing, construction and domestic help. Among the four types of employment, harvesting is arguably the one most rural residents enter into, so harvesting wage is one of the measures of local labour market conditions we use. Our result is also consistent with Beck, Singhal, and Tarp (2016) who used VARHS samples from coffee growing provinces and found that coffee price variation had no effect on school enrolment. This is also in line with Mavrokonstantis (2011) who found that working at age 12 is not correlated with math aptitude tests at age 15 using the Vietnam Young Lives survey. This finding suggests that in Vietnam work and study at the secondary level are not necessarily incompatible, possibly because of shorter school days. If work and schooling are not incompatible and work does not have detrimental effects on attainment, local labour market conditions would not necessarily be correlated with upper secondary completion.

Table 3.6: **Probability of upper secondary completion, by gender - LPM - Model 3, 4**

	Model 3			Model 4		
	Male	**Female**	**Dif.**	**Male**	**Female**	**Dif.**
	(1)	(2)	(3)	(4)	(5)	(6)
Log of household income	0.010	0.020		0.007	0.019	
	(0.017)	(0.014)		(0.016)	(0.014)	
Log of area of land with LUC (/100)	-0.711	0.480		-0.703	-0.003	
	(1.057)	(0.887)		(0.632)	(0.654)	
LUC held by men only	-0.003	-0.064		-	-	-
	(0.076)	(0.055)				
LUC held by women only	0.116	0.003		-	-	-
	(0.092)	(0.073)				
LUC held by men and women jointly	-0.067	0.059		-	-	-
	(0.084)	(0.052)				
LUC held by mother	-	-	-	-0.021	0.038	
				(0.061)	(0.044)	
Father's education (Default: no education)						
(At least) upper secondary	0.352***	0.132	+	0.355***	0.134	+
	(0.088)	(0.099)		(0.087)	(0.100)	
Lower secondary	0.258***	0.149		0.259***	0.147	
	(0.080)	(0.097)		(0.080)	(0.097)	
Primary	0.205**	0.156*		0.201**	0.156*	
	(0.076)	(0.093)		(0.076)	(0.093)	
Mother's education (Default: no education)						
(At least) upper secondary	0.394***	0.428***		0.401***	0.435***	
	(0.088)	(0.104)		(0.089)	(0.104)	
Lower secondary	0.190**	0.381***		0.186**	0.387***	
	(0.084)	(0.096)		(0.085)	(0.097)	
Primary	0.157**	0.248**		0.152**	0.248***	
	(0.073)	(0.093)		(0.075)	(0.093)	
Ethnicity - Kinh group	0.270***	0.063	+	0.266***	0.064	+
	(0.081)	(0.073)		(0.081)	(0.073)	
Upper secondary school in commune	0.126***	0.038		0.131***	0.046	
	(0.044)	(0.044)		(0.043)	(0.044)	
Birth order (Default: first-born)						
Second-born	0.031	-0.065		0.028	-0.070	
	(0.045)	(0.043)		(0.045)	(0.042)	
Third-born	-0.038	-0.099*		-0.041	-0.100*	
	(0.057)	(0.053)		(0.057)	(0.053)	
Later-born	-0.119	-0.146*		-0.123	-0.150*	
	(0.079)	(0.078)		(0.080)	(0.079)	
Observation	482	420		482	420	
R-squared	0.345	0.364		0.341	0.358	

Note: Constant, province and wave dummies are included. Robust standard errors are reported in parenthesis.

*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Gender difference denotes the significance level of gender interactions in a pooled model.

Source: Author's calculations using VARHS 2008-2016

Table 3.7: **Probability of upper secondary completion, by gender - LPM - Model 5 and 6**

	Model 5			Model 6		
	Male	**Female**	**Dif.**	**Male**	**Female**	**Dif.**
	(1)	(2)	(3)	(4)	(5)	(6)
Log of household income	0.011	0.020		0.007	0.019	
	(0.017)	(0.014)		(0.015)	(0.014)	
Log of area of land with LUC (/100)	-0.503	0.694		-0.584	0.252	
	(1.082)	(0.891)		(0.647)	(0.647)	
LUC held by men only	-0.012	-0.062		-	-	-
	(0.077)	(0.056)				
LUC held by women only	0.127	0.006		-	-	-
	(0.092)	(0.075)				
LUC held by men and women jointly	-0.081	0.059		-	-	-
	(0.085)	(0.053)				
LUC held by mother	-	-	-	-0.029	0.034	
				(0.063)	(0.044)	
Father's education (Default: no education)						
(At least) upper secondary	0.344***	0.148	+	0.348***	0.150	+
	(0.091)	(0.101)		(0.090)	(0.102)	
Lower secondary	0.268***	0.166*		0.268***	0.164*	
	(0.082)	(0.098)		(0.082)	(0.099)	
Primary	0.199**	0.180*		0.195**	0.180*	
	(0.078)	(0.094)		(0.078)	(0.094)	
Mother's education (Default: no education)						
(At least) upper secondary	0.379***	0.399***		0.385***	0.405***	
	(0.092)	(0.106)		(0.092)	(0.106)	
Lower secondary	0.184**	0.353***		0.176**	0.358***	
	(0.087)	(0.098)		(0.089)	(0.099)	
Primary	0.132*	0.211**		0.125	0.210**	
	(0.075)	(0.095)		(0.078)	(0.096)	
Ethnicity - Kinh group	0.274***	0.093	+	0.271***	0.097	+
	(0.083)	(0.076)		(0.083)	(0.077)	
Upper secondary school in commune	0.127**	0.038		0.132***	0.046	
	(0.045)	(0.043)		(0.044)	(0.044)	
Daily harvesting wage	0.042	-0.038		0.043*	-0.035	
	(0.026)	(0.069)		(0.026)	(0.069)	
Wage/salaried employment rate ratio by education	0.008	0.111**		0.006	0.105**	
	(0.048)	(0.045)		(0.050)	(0.046)	
Median household income ratio by education	0.002	0.037		0.002	0.039	
	(0.028)	(0.035)		(0.028)	(0.035)	
Commune distance to the nearest big city (/100)	0.026	0.075		0.028	0.081	
	(0.054)	(0.052)		(0.053)	(0.051)	
Birth order (Default: first-born)						
Second-born	0.029	-0.066		0.025	-0.071*	
	(0.046)	(0.043)		(0.046)	(0.043)	
Third-born	-0.044	-0.108**		-0.046	-0.110**	
	(0.058)	(0.052)		(0.058)	(0.053)	
Later-born	-0.134*	-0.140*		-0.137*	-0.145*	
	(0.079)	(0.078)		(0.081)	(0.078)	
Observation	469	416		469	416	
R-squared	0.344	0.374		0.339	0.368	

Note: Constant, province and wave dummies are included. Robust standard errors are reported in parenthesis.

*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Gender difference denotes the significance level of gender interactions in a pooled model.

Source: Author's calculations using VARHS 2008-2016, and Census 2009.

Other measures included the wage salaried employment rate ratio by education level, the median household income ratio by education level, and the distance from the commune to the nearest city. None of these were statistically significant except the local employment rate ratio by education. The local employment rate ratio by education is statistically significant for females, which implies that the higher ratio the wage salaried employment rate of completing upper secondary education over the wage salaried employment rate of completing only lower secondary school tends to increase the young female completion rate at upper secondary. However, this estimated effect is not statistically significant for males. This is in line with the results of no labour market link to the education attainment for males in rural areas (Coxhead & Shrestha, 2017) while they found that higher employment rates by foreign owned firms tend to increase female dropouts. Therefore, this could be explain why women tend to complete higher level of education than men.

3.6.2 Further results

We also do some further estimations by modifying the dependent variable to upper secondary enrolment conditional on having lower secondary education (shown in Table 3.8) and the upper secondary completion conditional on enrolling in upper secondary school (shown in Table 3.9).

Firstly, in term of conditional enrolment at upper secondary education, mother's education, especially at upper secondary level has strong positive effects for both boys and girls. The estimated effects are statistically significant for girls but not for boys. However, the effects of father's education are insignificant for both boys and girls. There is no significant difference of the effects of parental's education on the enrolment rate across genders. The results also suggest that the household resources and birth order have no significant effect on the enrolment for both boys and girls. In addition, males in households with head of household from the Kinh group are marginally significantly more likely than males with head of household from other ethnic group, to enrol upper secondary education after completing lower secondary education.

Table 3.8: **Conditional enrolment at upper secondary, by gender**

	Model 2		**Model 3**		**Model 5**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
	(1)	(2)	(3)	(4)	(5)	(6)
Log of household income	0.003	-0.014	0.003	-0.016	0.001	-0.016
	(0.014)	(0.010)	(0.014)	(0.010)	(0.014)	(0.010)
Log of area of land with LUC (/100)			0.010	-0.577	0.080	-0.508
			(0.820)	(0.625)	(0.818)	(0.604)
LUC held by men only	-	-	-0.002	0.022	0.005	0.017
			(0.046)	(0.043)	(0.046)	(0.044)
LUC held by women only	-	-	0.010	-0.003	0.011	-0.007
			(0.064)	(0.069)	(0.065)	(0.069)
LUC held by men and women jointly	-	-	0.019	-0.034	0.018	-0.038
			(0.053)	(0.040)	(0.051)	(0.040)
Father's education (Default: no education)						
(At least) upper secondary	0.142	0.051	0.142	0.054	0.152	0.061
	(0.096)	(0.085)	(0.097)	(0.086)	(0.098)	(0.090)
Lower secondary	0.112	0.037	0.112	0.035	0.133	0.038
	(0.091)	(0.077)	(0.092)	(0.076)	(0.093)	(0.079)
Primary	0.067	-0.046	0.067	-0.046	0.084	-0.041
	(0.091)	(0.082)	(0.092)	(0.083)	(0.093)	(0.086)
Mother's education (Default: no education)						
(At least) upper secondary	0.112	0.198**	0.115	0.206**	0.122	0.202**
	(0.101)	(0.083)	(0.100)	(0.084)	(0.103)	(0.088)
Lower secondary	0.122	0.155*	0.123	0.164**	0.127	0.161*
	(0.094)	(0.080)	(0.096)	(0.080)	(0.099)	(0.084)
Primary	0.087	0.154**	0.087	0.156**	0.088	0.153*
	(0.090)	(0.075)	(0.092)	(0.074)	(0.094)	(0.079)
Ethnicity - Kinh group	0.146	0.044	0.142	0.039	0.171*	0.041
	(0.089)	(0.064)	(0.090)	(0.063)	(0.092)	(0.071)
Upper secondary school in commune	-0.008	0.028	-0.008	0.035	-0.004	0.041
	(0.037)	(0.030)	(0.037)	(0.032)	(0.037)	(0.030)
Daily harvesting wage	-	-	-	-	0.028	-0.035
					(0.047)	(0.046)
Wage/salaried employment rate ratio by education	-	-	-	-	0.053	0.006
					(0.040)	(0.014)
Median household income ratio by education	-	-	-	-	0.033	-0.012
					(0.033)	(0.042)
Commune distance to the nearest big city (/100)	-	-	-	-	0.080*	0.008
					(0.046)	(0.046)
Birth order (Default: first-born)						
Second-born	0.001	-0.021	0.002	-0.022	0.012	-0.023
	(0.035)	(0.031)	(0.035)	(0.031)	(0.037)	(0.031)
Third-born	0.002	-0.010	0.004	-0.005	0.005	-0.009
	(0.046)	(0.040)	(0.046)	(0.040)	(0.046)	(0.040)
Later-born	-0.023	-0.052	-0.023	-0.044	0.003	-0.046
	(0.110)	(0.074)	(0.114)	(0.074)	(0.115)	(0.075)
Observation	350	335	350	335	344	334
R-squared	0.151	0.154	0.151	0.160	0.170	0.162

Note: Constant, province and wave dummies are included. Robust standard errors are reported in parenthesis.

*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

There are no gender differences in control variables when a pooled model with gender interactions is run.

Source: Author's calculations using VARHS 2008-2016, and Census 2009.

Similar to the previous completion rate (shown in Table 3.7), higher level of fathers'education are assosicated with higher completion rates for males and for females (relative to no primary education). However, these effects are statistically significant for males, but not for females. On the other hand, mother's education has statistically significant positive effects for boy and for girls. For example, the effect of upper secondary education of mother's education is estimated to be around 26 percentage points for girls, and 24 percentage points for boys. However, mother's education at lower secondary school is associated with an increase of completion rate of girls by approximately 24 percentage points.

In terms of the local economic economic conditions, there is no correlation between the communal harvesting wage, the wage salaried employment rate ratio by education or the median household income ratio by education, and upper secondary enrolment. However, the further communal distance to the nearest big city is marginally associated with the higher probability of enrolment at upper secondary level for males after lower secondary completion, but not for females. This reflects that boys'enrolment at upper secondary level are responsive to the labour market conditions. In particular, men in the commune, which is further to the biggest city, are more likely to enrol in upper secondary after lower secondary school, because this may keep them staying away from job opportunities there in order to continue their studying at upper secondary level which is not compulsory any longer. In contrast, with regards to completion rates, the results show that there is a loose link between the local labour market conditions and the completion rates for young men and women, with the exception of the median income of household where females in 25-45 years old reside. Its estimated effect on completion rate for girls is around 7.6 percentage points though it is marginally statistically significant.

Table 3.9: **Conditional completion at upper secondary, by gender**

	Model 2			**Model 3**			**Model 5**		
	Male	**Female**	**Dif.**	**Male**	**Female**	**Dif.**	**Male**	**Female**	**Dif.**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log of household income	0.002	-0.013		0.007	-0.011		0.003	-0.009	
	(0.023)	(0.010)		(0.025)	(0.010)		(0.026)	(0.011)	
Log of area of land with LUC (/100)				-1.067	0.139		-1.025	0.114	
				(1.323)	(0.873)		(1.329)	(0.896)	
LUC held by men only	-	-		-0.0003	-0.027		0.004	-0.025	
				(0.088)	(0.053)		(0.088)	(0.054)	
LUC held by women only	-	-		0.143	0.002		0.135	0.001	
				(0.088)	(0.060)		(0.086)	(0.061)	
LUC held by men and women jointly	-	-		-0.043	0.041		-0.036	0.042	
				(0.106)	(0.040)		(0.109)	(0.041)	
Father's education (Default: no education)									
(At least) upper secondary	0.349***	0.094		0.340***	0.086		0.326**	0.081	
	(0.130)	(0.114)		(0.128)	(0.115)		(0.133)	(0.122)	
Lower secondary	0.297**	0.085		0.291**	0.084		0.281**	0.078	
	(0.122)	(0.110)		(0.120)	(0.111)		(0.125)	(0.117)	
Primary	0.280**	0.101		0.278**	0.098		0.262**	0.101	
	(0.117)	(0.111)		(0.115)	(0.112)		(0.120)	(0.118)	
Mother's education (Default: no education)									
(At least) upper secondary	0.249*	0.277**		0.259**	0.273**		0.235*	0.264**	
	(0.131)	(0.114)		(0.126)	(0.116)		(0.131)	(0.118)	
Lower secondary	-0.0001	0.254**		0.025	0.247**		-0.019	0.238**	
	(0.129)	(0.106)		(0.125)	(0.107)		(0.130)	(0.109)	
Primary	0.008	0.138		0.032	0.134		-0.007	0.132	
	(0.120)	(0.102)		(0.115)	(0.102)		(0.119)	(0.105)	
Ethnicity - Kinh group	0.279**	-0.020		0.288**	-0.017		0.303**	-0.015	
	(0.125)	(0.072)		(0.122)	(0.072)		(0.128)	(0.079)	
Upper secondary school in commune	0.124**	-0.009	*	0.120**	-0.017	*	0.123**	-0.016	*
	(0.054)	(0.041)		(0.055)	(0.042)		(0.058)	(0.043)	
Daily harvesting wage	-	-		-	-		-0.049	-0.022	
							(0.075)	(0.057)	
Wage/salaried employment rate ratio by education	-	-		-	-		-0.028	0.040	
							(0.058)	(0.034)	
Median household income ratio by education	-	-		-	-		-0.064	0.076*	
							(0.044)	(0.046)	
Commune distance to the nearest big city (/100)	-	-		-	-		0.037	0.016	
							(0.072)	(0.057)	
Birth order (Default: first-born)									
Second-born	0.013	-0.016		0.028	-0.012		0.005	-0.011	
	(0.055)	(0.039)		(0.054)	(0.041)		(0.056)	(0.042)	
Third-born	-0.068	-0.047		-0.060	-0.045		-0.071	-0.050	
	(0.073)	(0.057)		(0.074)	(0.056)		(0.074)	(0.057)	
Later-born	-0.234*	-0.159*		-0.198	-0.160*		-0.246*	-0.149	
	(0.131)	(0.094)		(0.131)	(0.095)		(0.138)	(0.091)	
Observation	313	310		313	310		307	309	
R-squared	0.227	0.188		0.238	0.192		0.232	0.205	

Note: Constant, province and wave dummies are included. Robust standard errors are reported in parenthesis.

*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Gender difference denotes the significance level of gender interactions in a pooled model.

Source: Author's calculations using VARHS 2008-2016, and Census 2009.

In sum, the primary part of our results that contributes toward explaining the reverse gender gap, is the effects of mothers' education on females. This effect however is more than compensated by effects that work in the opposite direction. Fathers' education, region of residence, ethnicity of head of household, and birth order, all work toward increasing the gap. We estimate that if both males and females were treated as males, in the sense that secondary school completion for both were determined by the male coefficients, then the gap would be about 7 percentage points higher than it is.[7]

3.7 Conclusion

Measured as attaining an education at the upper secondary level or above, women's education attainment in Vietnam has been higher than men's since about the turn of the century. This higher attainment is not reflected in any significant improvement in the position of women in the labour market, so there are no obvious economic rewards sustaining this gap. In this paper we investigate the relationship between personal, household and local characteristics at age 15 and 16, with completion of upper secondary education at age 19 and 20. We choose the age of 15 and 16 because these are the ages when most young people in Vietnam make the decision to enter upper secondary education. The gender gap in upper secondary completion rates in our sample is 17.6 percentage points. To explain it we consider various characteristics, including birth order, father's and mother's education, household income, local labour market conditions, and expected economic returns, and we estimate the effects of these characteristics separately for males and females. We find that females are disadvantaged in the North of the country, in households with head of household of Kinh origin, and in relation to earlier born children. In contrast to boys, all of these characteristics have significant negative effects on the education attainment of girls. This implies that if females were treated equally to males, in the sense of female completion rates determined by the male estimated coefficients, the gender gap would be substantially higher. Therefore, it is necessary to support parent treat daughters and sons equally and invest in their education equally, which would be a basic foundation for better and equal education.

There is lack of the relationship with local labour market conditions. We find that local wage rates at age 15 and 16 have no effect on the completion rates of either males or females, which seems consistent with the Beck et al. (2016) and

[7]When estimated using probits, the increase in the reverse gap is even higher at 10 percentage points.

Mavrokonstantis (2011) studies which find no effects on enrolment and attainment respectively. However, the employment rate ratio by education marginally helps to increase the completion rate of upper secondary for males. The loose link between employment rate ratio by education and men's completion rate seem contradictory with the findings of Coxhead and Shrestha (2017) which suggest that male school attendance rates in rural areas are not correlated with foreign firm employment rates.

Nevertheless, this still leaves unanswered the question of why the option of schooling beyond lower secondary education is so much more attractive to females than males. Our estimation does not control for scholastic aptitude, but the most recent PISA scores show that in 2015 Vietnam there were no statistically significant differences in the performance of 15-year-old boys and girls in science literacy and maths, though girls' performance was significantly higher than boys in reading (OECD, 2018). It is unlikely therefore that scholastic aptitude would explain a large part of the gap.

To the best of our knowledge, there is no government policy in Vietnam aimed at reducing education costs specifically for women. There are scholarships from various non-profit organisations offered specifically to women, but it would be difficult to argue that the reverse education gap is sustained on the basis of such scholarships. Instead, our evidence suggests that girls face higher costs accessing education because of barriers within and outside their households. As of 2018, women's retirement age is still 5 years earlier than men's, and even if the proposed changes are introduced, the gender gap will only be reduced to 3 years. Earlier retirement and child bearing imply that women have less time than men to recoup their investments in education, therefore requiring a higher return. Moock, Patrinos, and Venkataraman (2003) estimated that women' return to secondary (vs primary) and university (vs secondary) education was higher than men's in 1992-93, which was before the large increases in attainment that we discussed above. It is likely that this return differential has dissipated after the reversal of the gender gap in education attainment. It therefore seems possible, if not likely, that women in Vietnam are over-educated, at least from a private rate of return to education point of view. The response to this challenge would not be to lower the attainment of future generations of women, but to increase employment opportunities requiring upper secondary (or higher) skills for both women and men.

3.A Appendix

3.A.1 Summary statistics of labour market conditions

Table 3.10: **Descriptive Statistics of local labour market conditions**

Daily harvesting commune wage	**Mean$_{M}$**	**Obs.**	**Mean$_{F}$**	**Obs.**	**Mean$_{M}$-Mean$_{F}$**
Year 2012	1.185	106 communes	1.178	87 communes	0.007
Year 2010	0.732	110 communes	0.707	88 communes	0.007
Year 2008	0.720	117 communes	0.564	96 communes	0.156**

Source: Authors' calculations from VARHS, and Census 2009

*, **, and *** denote significance for t-tests of mean equality of two groups at 10%, 5%, and 1%, respectively.

Commune distance to the nearest big city	**Mean**	**Obs.**
Year 2012	2.170	190 communes
Year 2010	2.233	196 communes
Year 2018	2.371	206 communes

Source: Authors' calculations from VARHS, and Census 2009

Table 3.11: **Descriptive statistics of expected economic returns variables**

Provinces	**Wage/salaried employment rate ratio by education**			**Median household income ratio by education**
	Mean$_{M}$	**Mean$_{F}$**	**Mean$_{M}$-Mean$_{F}$**	**Mean**
Ha Tay	2.155	5.098	-2.943	1.253
Lao Cai	5.534	9.388	-3.854	1.452
Phu Tho	2.417	6.712	-4.295	1.318
Lai Chau	3.434	5.203	-1.769	1.820
Dien Bien	8.169	9.589	-1.420	3.434
Nghe An	2.183	10.723	-8.540	1.247
Quang Nam	2.452	4.620	-2.168	1.582
Khanh Hoa	1.682	2.593	-0.911	1.273
Dak Lak	3.243	7.018	-3.775	1.601
Dak Nong	5.476	10.663	-5.187	1.016
Lam Dong	2.996	3.860	-0.864	1.416
Long An	1.172	2.067	-0.895	1.426
Total	3.454	6.461	-3.007	1.570
Observations	12 districts			12 districts

Source: Authors' calculations from VARHS, and Census 2009

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Appendix 6B: Statement of Authorship

This declaration concerns the article entitled:			
Gender Differences in Sector Allocation: The case of Urban Vietnam			
Publication status (tick one) **Draft manuscript** [x] **Submitted** [ ] **In review** [ ] **Accepted** [ ] **Published** [ ]			
Publication details (reference)			
Copyright status (tick the appropriate statement) I hold the copyright for this material [x] Copyright is retained by the publisher, but I have been given permission to replicate the material here [ ]			
Candidate's contribution to the paper (provide details, and also indicate as a percentage)	The considerably contributed to the following components of the research, according to the following percentages: Formulation of ideas: - Formulation of the research question (20%) - Collection and study of the relevant literature (85%) Design of methodology: (includes implementation): -- Collection and gaining command of the data (including programming to generate analysis dataset) (95%) --Choice of relevant econometric model (50%) --Specification of models (60%) --Estimation of models (80%) --Evaluation of models (60%) Experimental work: N/A Presentation of data in journal format: --Writing of paper (including formulation of structure of paper) (80%)		
Statement from Candidate	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature.		
Signed	Van Phan	**Date**	30/8/2019

Last update: Feb 2019

Chapter 4

Gender Differences in Employment Allocation: The Case of Urban Vietnam

Van Phan, Thanos Mergoupis, John Sessions

Abstract

We examine the factors that are associated with the allocation of male and female labour into wage/salaried employment or self-employment in the urban labour market by using the Vietnam Household Living Standard Survey (VHLSS). Our results show that education helps to pull both men and women out of the choice of not working. Having more education increases the propensity for both men and women to be in wage/salary sector. We find that the probability of working in the wage/salaried sector decreases for both genders due to the burden of the child care. However, sharing child care with the elderly in the household may be the way for women to exit self-employment to be wage-earners. We find significant gender differences in employment allocation. Men are more likely to work in the wage and salaried sector whereas women are more likely to be self- employed. However, in practice, most self-employment jobs in Vietnam are own-account vendors, which reflects insecurity rather than flexibility.

Keywords: gender, sector allocation, Vietnam
JEL classification: J16, J71.

4.1 Introduction

By the turn of the century in many, if not most of the countries in the world, women were achieving higher levels of education yet had lower earnings levels than men. In the OECD countries for example, 42 per cent of women aged 25-34 in 2010 had completed tertiary education compared to only one-third of men in the same age bracket, and nearly 60 per cent of higher education degrees were awarded to women (OECD, 2012). Women, however, are still at a disadvantage in careers and earnings, even if tertiary-educated. The gender gap emerges almost immediately after graduation, with only 56 per cent of women entering managerial and professional positions compared to 66 per cent of men (OECD, 2012). Even among tertiary graduates, women are more likely to work part-time. For example, two-thirds of tertiary educated 35-44 year old working women were full-time, compared with 88 per cent of same aged working men (OECD, 2012). So, the gender pay gap persists across countries and even becomes larger for those with. For example, among the 25-44 year olds in US and UK, the gender pay gap for those with children is almost triple compared to those without children (see Figure 4-1)(OECD, 2012).

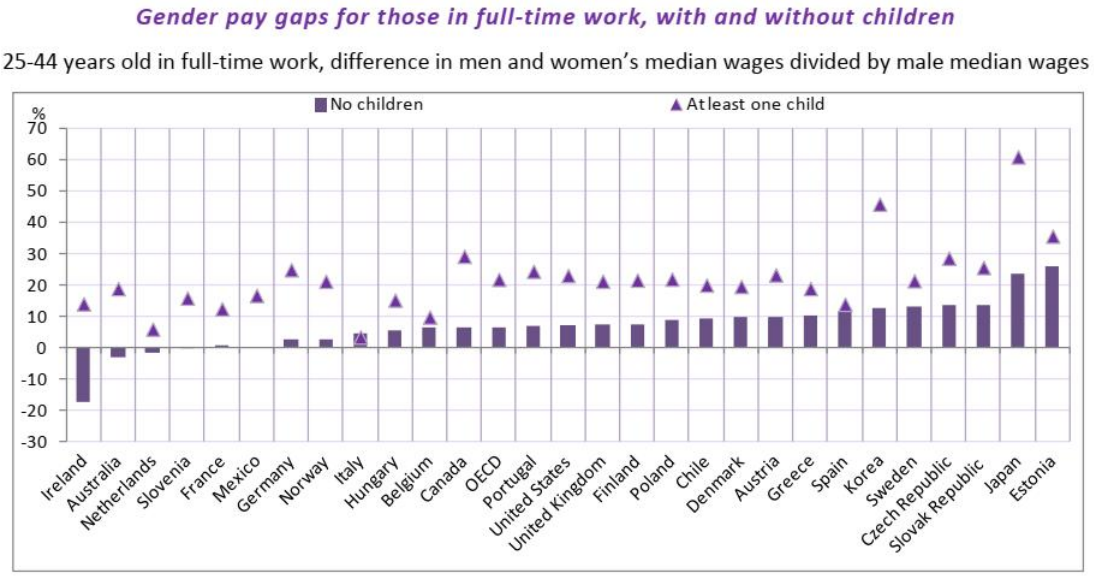

Figure 4-1: **Gender pay gaps for those in full-time work, with and without children (25-44 years olds)**

Source: OECD (2012)

In Vietnam the gender education gap favouring women emerged around the turn of the century and has widened since then (Dang & Glewwe, 2018; Mergoupis, Phan, & Sessions, 2018). For example, in terms of net enrolment rate in upper secondary education, had reached about 10 percentage points by 2014 (Dang &

Glewwe, 2018) while in terms of upper secondary completion rates of 19-20 year olds, different estimates put it between 9.0 and 17.7 percentage points in 2016 (Mergoupis et al., 2018). Nonetheless, women's earnings, on average, are still lower than men's. Although the female-to-male ratio in hourly wage rates increased from 0.76 in 1993 to 0.88 in 1998, it remained unchanged in 2002 (Pham & Reilly, 2007), while in 2017 average monthly earnings of women were 89.5 per cent of men's (GSO, 2018). Why do female earnings lag behind men's despite women being more educated than men? In this paper, we anticipate that an important reason for this outcome is the sectoral allocation of female labour. We find that whereas the majority of working age men are wage/salaried workers, the proportion of women working as wage/salaried workers is substantially lower. Women with the same observed characteristics as men tend to be self-employed instead. Our results resonate with studies of other developing countries that find self-employment to be very common. According to Gindling and Newhouse (2014), in low- and middle-income countries, fewer than half of all workers are wage and salary employees compared to over 85 per cent in high income countries. In particular, they show that an increase in per capita GDP within the low-income country group leads to a shift out of agricultural non-paid employment and own-account work into non-agricultural own account jobs. Then, as countries move from low-income to middle-income countries, employment status evolves as workers shift into wage/salaried work within both agriculture and non-agriculture. Therefore, it is essential to study the allocation in wage salaried employment and self-employment in developing countries. In Vietnam, for instance, household income, on average, improves as the number of people working in wage salaried employment increase (see Figure 4-2). In spite of its importance, there is little studies on this research area in Vietnam. Therefore, this study is the first Vietnamese study focused on gender difference in employment allocation.

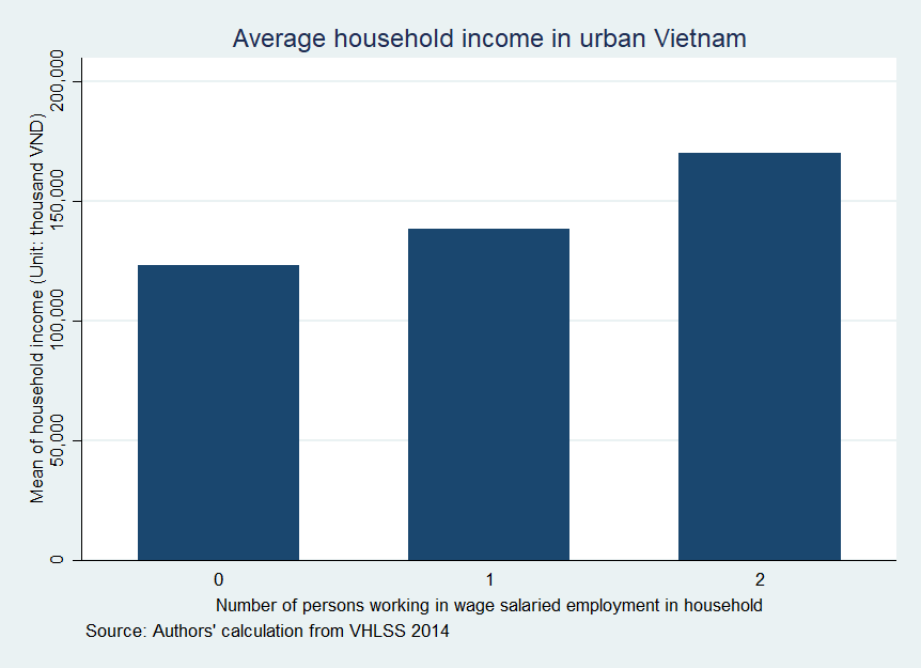

Figure 4-2: **Average of household's income in urban Vietnam, by numbers of people working in wage salaried employment**

In what follows we exploit the dataset Vietnam Household Living Standard Survey (VHLSS) to explore the evolution of the employment structure in Vietnam. We examine the factors that are associated with the allocation of male and female labour into wage salaried employment or self-employment in the urban labour market. We find significant gender differences in the allocation across wage/salaried employment, self-employment, and non-employment. Men are more likely to work in the wage and salaried sector whereas women are more likely to be self-employed. In particular, we find that household characteristics that are related to childcare have significant effects in the selection of employment status. To the extent that the process of selection into an employment status is captured by the coefficients of our model, we are able to address the question of what would the employment status of women be, if determined by the male coefficients. We find that the proportion of women working in the wage/salaried sector would be substantially higher while the proportion self-employed would be substantially lower, which suggests that selection into employment status is largely gender-specific and not observed characteristic-specific.

We proceed as follows. In the next section we discuss the various literature on selection into self-employment vs. wage/salaried employment in the developed countries and in the developing countries. In Section 3, we sketch gender differences within and outside the Vietnamese labour market. Section 4 describes the data whilst methodology is discussed in Section 5. Our results are discussed in Section

6, and Section 7 concludes.

4.2 Literature review

The role of self-employment has recently attracted a lot of attention of researchers because there has been a controversial issue of whether working in self-employment is a choice or a necessity. According to the first view, self-employment has grown and become an important potential source of new jobs, which absorbs a supply of entrepreneurial talent. This is in contrast to the alternative view that self-employment is an involuntary and transitory option that provides low earnings for survival. The allocation of labour between self-employment and wage/ salaried employed, therefore, has emerged as an important issue in general (Le, 1999; Pietrobelli, Rabellotti, & Aquilina, 2004), and specifically in developing countries where self-employment rates are systematically higher as compared to wage/salaried employment rate (Fields, 2014). In the literature, Blau (1985) initially proposed a model of individual choice between wage and self-employment sector in the context of less developed countries. However, there is lack of study which has systematically examined gender differences in the sectoral allocation in developing countries (i.e. wage salaried employement vs. self-employment).

The literature overwhelmingly identifies educational attainment as a key determinant of employment choice. There are several channels through which the level of education may influence the propensity to become self-employed (Le, 1999). Managerial and entrepreneurial skills can be developed and refined through education, which may lead to an increase in the proclivity to enter self-employment. But on the other hand, it is possible that more educated individuals may be attracted towards wage/salary employment and thus less likely to be self-employed. Indeed, some empirical studies such as Borjas (1986), Rees and Shah (1986), Kidd (1993), Le (2000) and Georgellis and Wall (2005) find the mixed effect of education on the allocation of workers in either wage/salary employment or self-employment in some selected OECD countries. Furthermore, the impacts of educational attainment on the propensity to be self-employed may not be the same for all groups of workers, for example, native born versus immigrants (Borjas, 1986; M. Evans, 1989; Kidd, 1993). In particular, Kidd (1993) found that educational attainment does not have a significant influence on propensity to be self-employed among Australian immigrants whereas the lower probability to be self-employed among Australian immigrants is associated with increasing education (M. Evans, 1989).

Some studies have focused on the role of financial factors in setting up businesses. They argue that a lack of sufficient financial capital and/or sufficient access

to credit markets is a binding constraint on an individual's choice between salaried- and self-employment (see Bernhardt, 1994; Blanchflower & Oswald, 1998; Constant & Zimmermann, 2006; D. S. Evans & Jovanovic, 1989; Lindh & Ohlsson, 1998 for OCED countries).

Another aspect that has attracted much attention is the influence of intergenerational transfers of entrepreneurial ability on the probability of being self-employed (see Dunn & Holtz-Eakin, 2000; Hout & Rosen, 2000; Taylor, 1996). For example, using parental labour market status as a proxy for potential intergenerational transfers of entrepreneurial ability, Dunn and Holtz-Eakin (2000) found a strong positive link between the employment status of parent as self-employed and the propensity of male self-employment in the US. Interestingly, this link is even stronger along gender lines, which means that the probability of a son becoming self-employed is higher if his father rather than his mother was self-employed.

There is scant empirical evidence emphasizing the gender difference in employment allocation in developing countries in general - see Pradhan and Soest (1997) for Bolivia; Lehmann and Pignatti (2007) for Ukraine, Lehmann and Zaiceva (2015) for Russia, and Comola and De Mello (2011) for Indonesia. The focus of these studies is about the allocation of employment into formal and informal sector. For example, by using the Ukrainian Longitudinal Monitoring Survey 2003-2004, Lehmann and Pignatti (2007) found that most workers try to enter formal employment at any stage of their working life since informal employment is considered a waiting stage for entry into formal employment. However, the move into involuntary self-employment in urban gives workers more wage gains relative to those moving into formal employment. Studies focussing specifically on Vietnam include Liu (2004), Do and Duchene (2008) and Demombynes and Testaverde (2018). For the most part, these studies estimate employment allocation in order to control for self-selection in earnings regressions (e.g. Liu, 2004). Do and Duchene (2008) emphasized the role of financial resources in an individual's working choice. They found that house ownership significantly increases the propensity of males, but not females, to be self-employed. In terms of educational attainment, Do and Duchene (2008) suggest that less educated individuals are more likely to be self-employed. They also find that the number and age of children affected employment choice differently for men and women. Demombynes and Testaverde (2018) examines gender difference and ethnicity differences in the likelihood of holding a wage job by using the Vietnamese Labour Force Survey 2007-2014. Controlling for individual characteristics such as age, education, and region, they find that women were approximately 9 per cent less likely than men to be in salaried employment over the period of the survey. Ethnic minorities (i.e. non-Kinh groups) were also

less likely to be employed in the wage sector.

Some argue that self-employment is a way for women to cope with the asymmetric burden of childcare. They suggest that women in developed countries choose self-employment as a way of balancing work and family commitments, in particular if there are young children living in the household due to its flexibility (Boden, 1999; Wellington, 2006). It should be noted however that this often recorded as self-employed in developing countries, are either own-account or contributing family workers who have a limited access to the raft of employment and social protection rights (ILO, 2018b). Self-employment therefore often reflects insecurity rather than flexibility.

Some studies have noted the importance of intergenerational links and grandparental childcare in particular, for mothers' labour force participation. These studies have shown that mothers are more likely to engage in paid work when grandparents are providing childcare in some European countries (see Agüero & Marks, 2011; Del Boca, 2002; Ware et al., 2001; Wistow & Hardy, 1999). Grandparents caring for grandchildren have been quite common experience for many families in developing countries (Knodel & Debavalya, 1997; Maurer-Fazio, Connelly, Chen, & Tang, 2011). For example, Maurer-Fazio et al. (2011) found that co-residency with parents and/or parents-in-law increases prime-aged women's labour force participation rates in China by 6.6 percentage points because they are providing help in the household, especially childcare, which facilitates women's employment.

4.3 Gender differences within and outside the labour market in Vietnam

In Vietnam, gender parity in education was achieved by the early 1990s and a reverse gap started emerging by the turn of the century. By 2006, enrolment rates for girls at both lower and upper secondary levels exceeded those for boys. In terms of completion rates, while there is no significant gender difference at primary level, a substantial reversal emerged at the secondary level. The completion rate at upper secondary level for women was 4 percentage points higher than men as early as 1993 (Nguyen, 2004). Since then, the gap has increased dramatically, reaching 14 percentage points in 2014 (see Figure 4-3).

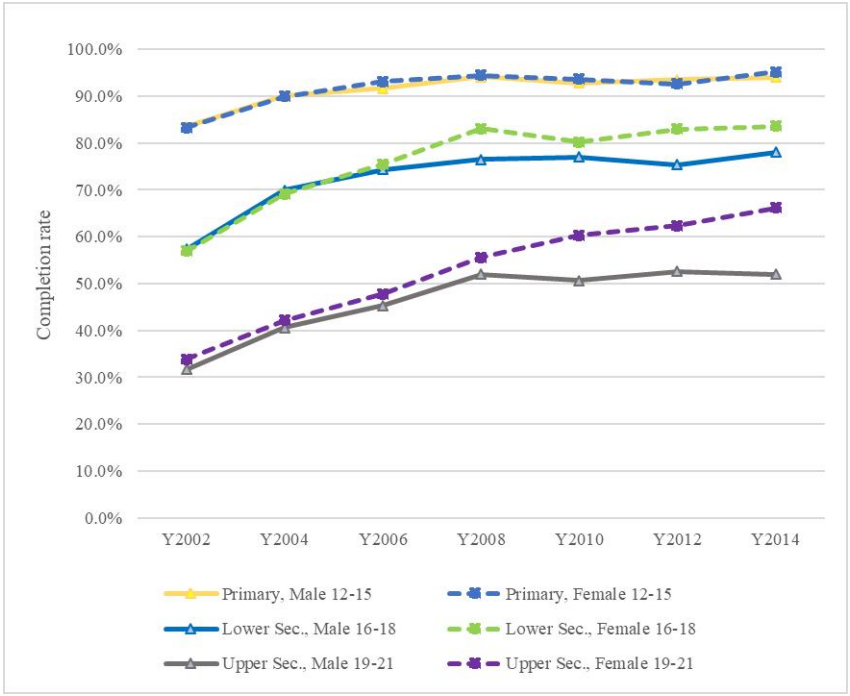

Figure 4-3: **Completion rate by school level and gender, Vietnam, 2002-2014**
Source: Authors' calculations from VHLSS

The reversal of the gender education gap does not imply the elimination of gender inequality, although the relative position of Vietnamese women in the labour market has improved. For example, women's labour force participation rate is relatively high - 76 per cent as compared with 49.6 per cent for women globally and 61.1 per cent for women in East Asia and the Pacific in 2015 (Cunningham, Alidadi, & Buchhave, 2018). Yet, it is still lower than that for men (Cunningham et al., 2018). More working women are likely to engage in farming than working men, for example, in 2014, 44 per cent for women compared to 39 per cent for men while more than 40 per cent of working men compared to 32 per cent of working women are wage-earners (Demombynes & Testaverde, 2018).

Agricultural employment in Vietnam declined sharply in the early 1990s. Displaced women who remained in rural areas moved predominately into non-agricultural self-employment whereas those women who migrated to urban areas moved almost entirely into wage employment (Gallup, 2002). Meanwhile, there was an almost equal transfer of male employment into non-agricultural self-employment and wage employment across both rural and urban areas (Gallup, 2002).[1]

In spite of the reversal gender gap in education and the improvements in the relative position of women in the labour market, the gender wage gap still persists

[1]Cunningham et al (2018) highlights the growing export sector, particularly in textiles, which has recently attracted many contracted wage-paying women in employment; in 2017, for example, 53 per cent as compared to 35 per cent held by men.

overtime although it has fallen in recent years, for example, women's hourly wage was 15.4 percentage points lower than males' hourly wage in 2011 and 12.6 percentage points lo**wer** in 2014 (Demombynes & Testaverde, 2018). Overall then, there is no indication that the reversal of gender education gaps significantly payed off for women in Vietnam. This is also consistent with the studies of Doan, Le, and Tran (2018); Oostendorp and Doan (2013). We illustrate the gender gap in monthly earnings in state, non-state and foreign-invested firms for the period 2011-2014 in Figure 4-4. State-owned firms have had consistently the lowest gender earnings gap at around 10 per cent, whereas the largest gender earnings gap is found in foreign invested firms, reaching to 28 per cent in 2011.

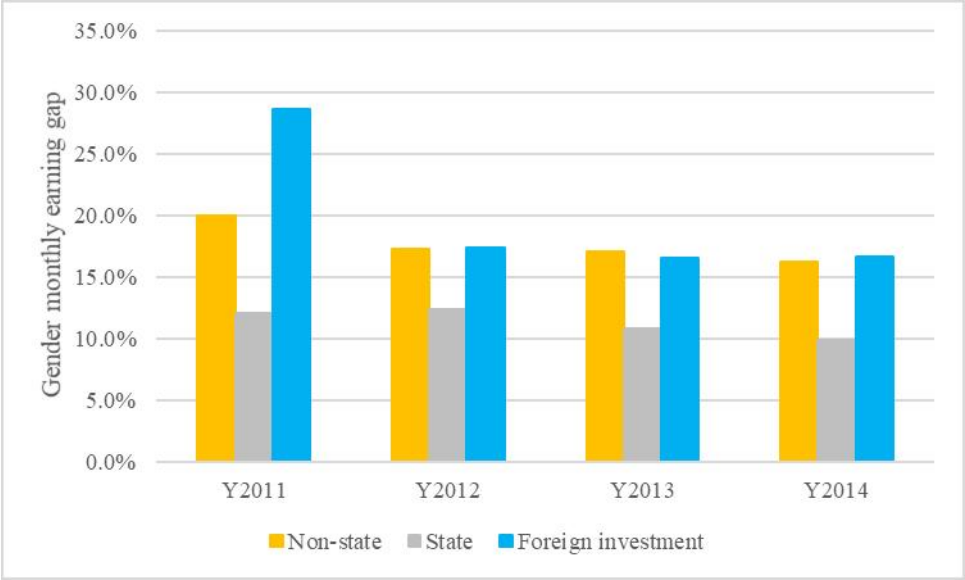

Figure 4-4: **Gender gap in monthly earning by gender, Vietnam, 2011-2014**
Source: Labour Force Survey 2011, 2012, 2013, 2014 (GSO)

The gender gap can be partially explained by the difference in occupational segregation since women are disproportionately represented in low-paying occupations (Cunningham et al., 2018) . For example, more than 60 percent of women work in the service/sales sector where the female-to-male ratio in monthly wage earnings is around 0.85. Yet, gender segregation also persists at the top of the occupation ladder. In particular, only 25 per cent of managers are women, and they are lower paid than their male counterparts (GSO, 2016). Furthermore, women's wage is, on average, lower than men's because women spend significantly more hours on unpaid household work than men (Cunningham et al., 2018). For example, it was reported that women with no education do more than 9 hours of unpaid care work daily (United Nation (UN), 2016). Thus, household responsibilities limit women's access to the labour market or push them into lower-paying but family-friendly jobs.

In sum, despite the partially improved position of women outside labour market due to higher levels of education, gender differences both within and outside the labour market are stubbornly persistent. As a result, despite overtaking men in education attainment, Vietnamese women are still at a disadvantage in careers and earnings.

4.4 Data analysis

In this paper we use the wave 2002 Vietnam Living Standard Survey (VLSS), 2008 and 2014 Vietnam Household Living Standard Survey (VHLSS), national survey of households and communes conducted biennially, which allows us to sketch the evolution of the employment allocation in Vietnam overtime, and also identify how the individual and household characteristics are associated with the allocation of male and female labour into wage salaried employment and self-employment in the urban labour market.[2] Particularly, in this study, we focus on those respondents aged 22 to 55 in urban areas.[3].

Table 4.1 compares the distribution of 22-55 years olds across three employment categories in the 2002, 2008 and 2014 VHLSS, namely wage/salary employment, self-employment, and not working. In three different waves, the majority of men were employed in the wage/salary sector, with 53 per cent in 2002 and 58 per cent in 2014. The increase in the proportions employed in the wage/salaried sector is also evident for women, whose percentages increased more rapidly from 35.3 to 47.27 per cent. Although for both men and women, the increases in the proportions wage/salaried came mostly from the self-employed, in 2014 the proportions of the self-employed remained sizeable at 34.8 percent for men and 40.6 per cent for women. It is worth noting however that whereas during this period the proportion of men not working remained stable at about 7 per cent, the proportion of women not working declined from 15.1 to 12.5 per cent.

[2]See the further introduction of VHLSS dataset in the Appendix.

[3]In Vietnam, the working age is officially from 15 to 55 years old for women, and from 15 to 60 years old for men. However, we do not extend the analysis in this age range because the large proportion of those aged 15-22 years old are still at school for education

Table 4.1: **Distribution of employment sector of 22-55 year olds in urban areas, by survey**

	Male	Female	Male-Female gap
VHLSS 2002 (urban)			
Wage/Salary sector	53.0%	35.3%	17.7%
Self-employment	39.8%	49.6%	-9.8%
Not working	7.3%	15.1%	-7.8%
VHLSS 2008 (urban)			
Wage/Salary sector	58.6%	45.0%	13.6%
Self-employment	33.0%	39.8%	-6.8%
Not working	8.4%	15.1%	-7.7%
VHLSS 2014 (urban)			
Wage/Salary sector	58.1%	47.2%	10.9%
Self-employment	34.8%	40.6%	-5.8%
Not working	7.2%	12.5%	-5.3%

Note: Self-employment sector includes self-employment in agriculture and self-employment in non-agriculture.

Sample sizes: VHLSS 2002: 13,099 observations (6,429 males & 6,670 females)

VHLSS 2008: 4,208 observations (2,039 males & 2,169 females)

VHLSS 2014: 4,980 observations (2,397 males & 2,583 females)

Source: Authors' calculations from VHLSS 2002, 2008, 2014.

Table 4.2 presents summary statistics of the variables used in our analysis, by gender. Gender differences in the means of individual characteristics and household characteristics tend to be small, which is shown in the last column of the table 4.2. We do not observe any significant differences between male and female in most of individual characteristics and household characteristics, except education, and marital status. Particularly, we note a statistically significant approximately 3-percentage point differential in primary education favouring for women, but a statistically significant around 2-percentage point and 8-percentage point differential in vocational education favouring for men in 2002, and 2014, respectively. We also note that there is a statistically significant around 4 or 5-percentage point differential in divorced/separated/widowed marital status in favour for women.

Table 4.2: **Summary Statistics**

	Male		**Female**		**Difference**
	Mean	**Std.Dev.**	**Mean**	**Std.Dev.**	**Mean$_M$ - Mean$_F$**
	(1)	(2)	(3)	(4)	(5)
Year 2002					
Age	37.516	8.718	37.571	8.738	-0.055
Age square (/100)	14.834	6.608	14.879	6.654	-0.045
Born before 1968	0.600	0.490	0.603	0.489	-0.003
Education (Reference: No education)					
Primary	0.208	0.406	0.236	0.425	-0.029***
Lower secondary	0.007	0.085	0.008	0.088	-0.000
High school	0.171	0.377	0.164	0.370	0.008
Vocation	0.143	0.350	0.126	0.332	0.017**
College or above	0.148	0.355	0.108	0.310	0.040***
Non-Kinh ethnicity	0.063	0.244	0.064	0.246	-0.001
Marital status (Reference: Single)					
Married	0.749	0.434	0.756	0.429	-0.007
Divorced/Separated/Widowed	0.019	0.138	0.073	0.259	-0.053***
Number of children under 6 years old	0.330	0.582	0.338	0.590	-0.008
Presence of the elderly over 60 years old	0.255	0.436	0.260	0.439	-0.005
Observations	6,429		6,670		
Year 2014					
Age	38.549	9.276	38.388	9.180	0.161
Age square (/100)	15.721	7.172	15.579	7.096	0.142
Born before 1968	0.252	0.434	0.241	0.428	0.012
Education (Reference: No education)					
Primary	0.164	0.371	0.191	0.393	-0.026*
Lower secondary	0.202	0.401	0.216	0.412	-0.015
High school	0.146	0.353	0.161	0.368	-0.015
Vocation	0.194	0.395	0.111	0.314	0.083***
College or above	0.225	0.418	0.242	0.428	-0.017
Non-Kinh ethnicity	0.073	0.260	0.069	0.253	0.004
Marital status (Reference: Single)					
Married	0.792	0.406	0.800	0.400	-0.008
Divorced/Separated/Widowed	0.028	0.164	0.067	0.249	-0.039***
Number of children under 6 years old	0.417	0.623	0.404	0.608	0.013
Presence of the elderly over 60 years old	0.257	0.447	0.253	0.435	0.003
Observations	2,397		2,583		

Source: Authors' calculations from VHSS 2002, VHLSS 2014

Note: Column (5) shows mean difference between male and female.

*, ** and *** denote significance for t-tests of mean equality of two groups at 10%, 5% and 1%, respectively.

Missing education values are dropped.

Variables definitions are presented in Appendix.

4.5 Methodology

The paper aims to identify the main individual characteristics and the main household characteristics that are associated with the allocation across the following employment categories: (i) employed in wage/salary sector, (ii) self-employed (both in agriculture and in non-agriculture), and (iii) not working. Unlike in developed countries however, where it is relatively rare for a person to be employed both as a wage/salaried worker and in self-employment, in developing countries this is not uncommon. In our sample, for those who have had more than one jobs, we used the time spend on each job to allocate them to the employment category that corresponded to the job they spend most time on.

We model the selection into one of the three employment categories using multinomial logit. We investigate the question of whether gender-specific processes matter in the allocation across employment categories, using the approach pioneered by Abowd and Killingsworth (1984) to analyse racial differences in the allocation across employment categories in the US. Gender-specific processes are captured by differences in coefficients in models estimated by gender. Gender differences in coefficients may arise from differential treatment of women both within and outside the labour market, or from their own different preferences. Our models cannot identify the locus where the differential treatment arises. What we can identify is whether differential treatment exists, and the extent of it.

This model assumes that each individual may select among mutually exclusive alternatives of employment status. Comparing the maximum utility attainable given each employment status, each individual selects the alternative which yields the maximum utility.

Let U_{ij} be the maximum utility attainable for the i^{th} individual if this person works in a particular j^{th} labour force category among M alternatives and suppose that this indirect utility function can be decomposed into a non-stochastic component (Z) and a stochastic component (ε), shown as

$$U_{ij} = Z_{ij} + \varepsilon_{ij} \tag{4.1}$$

where Z_{ij} is a linear function of observed individual variables, defined as $Z_{ij} = X_{ij}\beta_{ij}^{'}$ and ε_{ij} is a function of unobserved variables.

Then, the equation 4.1 should be written again, shown as

$$U_{ij} = X_{ij}\beta_{ij}^{'} + \varepsilon_{ij} \tag{4.2}$$

where X_{ij} is a vector of independent variables explaining employment status choice

and β_{ij} is a parameter vector.

As suggested above, one individual works in a certain employment category with the highest maximum utility. Then, the probability that the i^{th} individual works in a particular j^{th} labour force category is given by

$$P_{ij} = Pr(U_{ij} > U_{ik}), k \neq j, and\ j, k = 1, 2, ..., M \tag{4.3}$$

Then substituting 4.1 into 4.3, we have

$$P_{ij} = Pr(Z_{ij} + \varepsilon_{ij} > Z_{ik} + \varepsilon_{ik}) = Pr(Z_{ij} - Z_{ik} > \varepsilon_{ik} - \varepsilon_{ij}) \tag{4.4}$$

If the stochastic components have independent and identical Weibull distributions $F(\varepsilon_{ij}) = exp[exp(-\varepsilon_{ij})]$, then the difference between the errors $(\varepsilon_{ik} - \varepsilon_{ij})$ has a logistic distribution and the choice model is multinomial logit (see McFadden, 1974). As a result, the probability that responds to the j^{th} alternative is

$$Pr(Y_i = j) = P_{ij} = \frac{exp(X_i\beta_j^{'})}{\sum_{j=1}^{M} exp(X_i\beta_j^{'})} \tag{4.5}$$

Because the summation of the probabilities over all alternatives equals 1, only $(M-1)$ of the probabilities can be determined independently. To identify the model, we have to set $\beta_j = 0$. Under this identification, let the base outcome be 1, so the probabilities of each alternative are determined as follows

$$Pr(Y_i = 1) = P_1 = \frac{1}{1 + \sum_{j=2}^{M} exp(X_i\beta_j^{'})} \tag{4.6}$$

$$Pr(Y_i = m) = P_m = \frac{exp(X_i\beta_j^{'})}{1 + \sum_{j=2}^{M} exp(X_i\beta_j^{'})}, \quad m = 2, 3, ..., M \tag{4.7}$$

The relative probability of $Y_i = m, m > 1$, to the base outcome is

$$\frac{Pr(Y_i = m)}{Pr(Y_i = 1)} = \frac{P_m}{P_1} = exp(X_i\beta_j^{'}) \tag{4.8}$$

The logarithm of the risk-ratio does not depend on the other choices. This is also one assumption of the multinomial logit model, which is called the independence of irrelevant alternatives (IIA).[4] However, it seems difficult to interpret the

[4]The independence of irrelevant alternatives (IIA) means that, all else being equal, a persons's choice between two or more than two alternative outcomes is unaffected by what other choices are available. The IIA assumption does not allow for different degrees of substitution or complementarity among the choices. In general, the violation of IIA assumption may yield inconsistent parameter estimates and biased forecasts in Multinomial logit model. The magnitude of these

coefficients in this model. Thus, the best way to interpret the effect of one-unit change in one control variable, other things being held constant, on the probability of being in each alternative is based on the marginal effect.

4.6 Results and discussion

4.6.1 Regression results

Results from logits on the selection into wage/salaried employment, self-employment, and not working, estimated by gender, are presented in Table 4.3 for the year 2014 and Table 4.4 for the year 2002.[5] We also check the results of these regressions with province fixed effects (shown in Appendix), which are quite similar to the previous models.

According to the results, we note that for men and women age matters, with older respondents more likely to be working in the wage/salaried employment than not working, but age appears to have no effect on the probability of self-employment. Having entered adulthood before the start of the economic reforms in 1986 (i.e. born before 1968) is positively correlated with the probability of working in the wage/salaried sector, but its effect is not statistically significant for either men or women (see Table 4.3). The probability of those born before 1968 not working is around 5 or 6 percentage points lower than that of those born after 1968. However, in the wave 2002, we do not find the similar results because of the 12 year different window. Therefore, we also pool the wave 2002, 2008, and 2014, and control birth cohort, which allows to separate out the effects of age and cohort, which is shown in Table 4.5. The results show that the probability of men in birth cohort 1948-1953, and 1954-1959 not working is statistically approximately 8.5 and 6.5 percentage points higher that of men in birth cohort 1966-1971, respectively. However, on the women's side, those in birth cohort 1948-1953, 1954-1959, and 1960-1965 are around 11.4 percentage points, 6 percentage points, and 3.4 percentage points less likely to work in self-employment, respectively. In addition, men in their younger age group are more likely to work in wage salaried employment. For example, the probability of men in the birth cohort 1972-1979 and 1980-1985 working in wage salaried employment increases by around 4 and

errors will depend on the degree to which the property is violated. However, alternative specific multinomial probit model, which allows for arbitrary correlation in unobserved errors across the choices, could be employed for robust check.

[5]In 2014, we also control health problem, which refers to whether this person has had such a severe injury over the last 12 months that he/she has to lie down in a place and be taken care by a bedside caregiver or stop working or not participate in normal activities. However, in wave 2002, we do not control this variable due to the data limit.

Table 4.3: **Probability of employment choice, by gender, year 2014 - Multinomial logit model**

	Male						**Female**						**Difference**		
	Wage/Salary		**Self-employment**		**Not working**		**Wage/Salary**		**Self-employment**		**Not working**		**WS**	**SE**	**NW**
	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err			
Age	0.019	0.014	0.015	0.013	-0.035***	0.007	0.028**	0.012	0.012	0.012	-0.040***	0.008			
Age square (/100)	-0.039**	0.019	-0.009	0.018	0.048***	0.010	-0.048***	0.017	-0.008	0.017	0.056***	0.012			
Born before 1968	0.073	0.046	-0.011	0.042	-0.062**	0.030	0.030	0.044	0.030	0.041	-0.060*	0.034			
Education (Ref: No education)															
Primary	-0.018	0.039	0.035	0.036	-0.017	0.022	0.033	0.036	0.012	0.032	-0.045*	0.024			
Secondary	-0.021	0.038	0.046	0.035	-0.025	0.022	0.070*	0.036	-0.036	0.032	-0.034	0.024		+	
Highschool	-0.019	0.040	-0.013	0.038	0.032	0.021	0.111***	0.037	-0.080**	0.034	-0.031	0.025	+++		++
Vocational	0.187***	0.039	-0.132***	0.036	-0.055**	0.023	0.360***	0.037	-0.304***	0.037	-0.056**	0.028	+++	+++	
College or above	0.425***	0.042	-0.415***	0.041	-0.011	0.021	0.554***	0.035	-0.493***	0.037	-0.061**	0.026	+++	++	+
Non-Kinh group	-0.040	0.038	0.058	0.036	-0.018	0.021	0.026	0.036	0.004	0.035	-0.030	0.030			
Health problem	-0.034	0.044	-0.037	0.043	0.072***	0.016	0.002	0.038	-0.034	0.037	0.032	0.026			+
Big cities (Ha Noi or HCMC)	0.019	0.032	-0.041	0.031	0.023	0.016	0.019	0.027	-0.095***	0.028	0.076***	0.019			
Marital status (Ref: Single)															
Married	0.089***	0.033	0.018	0.032	-0.107***	0.016	0.007	0.030	0.075**	0.031	-0.083***	0.019	++		+++
Divorced/Separated/Widowed	0.106*	0.061	-0.092	0.060	-0.014	0.024	0.081*	0.042	0.015	0.042	-0.096***	0.030			
Number of children under 6	-0.033*	0.019	0.021	0.018	0.012	0.011	-0.057***	0.019	0.015	0.018	0.042***	0.013			
Presence of the elderly aged 60+	0.020	0.027	-0.025	0.026	0.006	0.013	-0.002	0.024	0.025	0.024	-0.022	0.019			
Children x Elderly aged 60+	0.036	0.034	-0.018	0.032	-0.019	0.019	0.053*	0.031	-0.087***	0.032	0.037*	0.020			+
Region fixed effects	Yes		Yes		Yes		Yes		Yes		Yes				
Observations	2397						2583								
LR chi2	731.08						1026.23								
Pseudo R2	0.1752						0.2034								

Note: Standard errors are next to marginal effects. Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Source: Author's calculations from VHLSS 2014

Table 4.4: **Probability of employment choice, by gender, year 2002 - Multinomial logit model**

	Male						Female						Difference		
	Wage/Salary		**Self-employment**		**Not working**		**Wage/Salary**		**Self-employment**		**Not working**		**WS**	**SE**	**NW**
	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err			
Age	0.018**	0.008	0.017**	0.008	-0.035***	0.004	0.006	0.007	0.047***	0.007	-0.053***	0.005	+		+
Age square (/100)	-0.032***	0.010	-0.015	0.010	0.047***	0.005	-0.015*	0.008	-0.053***	0.009	0.068***	0.006	+		++
Born before 1968	-0.045*	0.025	0.005	0.025	0.040**	0.016	-0.005	0.022	-0.016	0.024	0.021	0.019			
Education (Ref: No education)															
Primary	-0.011	0.016	0.027*	0.015	-0.016*	0.009	-0.035**	0.015	0.044***	0.015	-0.009	0.011			
Secondary	-0.020	0.068	-0.028	0.065	0.048*	0.029	0.138**	0.055	-0.079	0.064	-0.058	0.058	++		++
Highschool	0.025	0.017	-0.059***	0.016	0.034***	0.008	0.070***	0.015	-0.065***	0.016	-0.005	0.012	+++		+++
Vocational	0.230***	0.018	-0.197***	0.018	-0.033***	0.012	0.319***	0.015	-0.226***	0.019	-0.093***	0.019	+++	+++	++
College or above	0.388***	0.020	-0.366***	0.020	-0.022**	0.010	0.457***	0.017	-0.423***	0.025	-0.034*	0.018	+++	+++	
Non-Kinh group	-0.028	0.025	0.041*	0.024	-0.013	0.014	-0.017	0.023	0.022	0.024	-0.005	0.019			
Big cities	0.112***	0.020	-0.123***	0.020	0.011	0.009	0.069***	0.016	-0.128***	0.019	0.059***	0.014			
Marital status (Ref: Single)															
Married	0.002	0.020	0.116***	0.019	-0.119***	0.011	-0.062***	0.016	0.066***	0.018	-0.004	0.013	++		+++
Divorced/Separated/Widowed	-0.028	0.046	0.057	0.044	-0.029	0.018	-0.002	0.025	0.016	0.027	-0.014	0.020			
Number of children under 6	0.030**	0.014	0.007	0.013	-0.037***	0.011	-0.015	0.012	-0.003	0.012	0.018**	0.009	++		+++
Presence of the elderly aged 60+	0.007	0.017	-0.010	0.016	0.002	0.008	0.033**	0.014	-0.016	0.016	-0.016	0.012			
Children x Elderly aged 60+	-0.052**	0.022	0.013	0.021	0.039***	0.014	-0.011	0.019	-0.001	0.020	0.012	0.014			++
Region fixed effects	Yes		Yes		Yes		Yes		Yes		Yes				
Observations	6429						6670								
LR chi2	887.35						1221.55								
Pseudo R2	0.1475						0.1596								

Note: Standard errors are next to marginal effects. Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Source: Author's calculations from VLSS 2002

10 percent points. However, these effects for young women are not statistically significant.

One of the major determinants of allocation across employment categories is educational attainment. Table 4.3 shows that primary education reduces the probability of not working for females by 4.1 per cent. The higher the level of education obtained, the higher the propensity for females to enter wage/salaried employment; for instance, by 3.5 percentage points at upper secondary education, 25 percentage points at vocational education, and 20 percentage points at college education or above. In comparison, obtaining vocational education increases the probability of being in wage/salaried employment for males by around 20 percentage points while there is an increase of 24 percentage points in the propensity of being in wage/salaried employment for males with a college degree or above. In short, more education may facilitate entry into wage/salary sector and thus depresses the likelihood of becoming self-employed, which is in line with the studies of M. Evans (1989), De Wit (1993), Kidd (1993) and Do and Duchene (2008). The result is also consistent with the finding of Demombynes and Testaverde (2018), which shows that Vietnamese workers with higher levels of education are less likely to work in farming and much more likely to hold wage jobs. Nevertheless, this result contrasts with the argument that education can enhance the managerial ability of a person and then facilitate the entry into self-employment sector, which may be explained by the fact that most self-employment jobs in Vietnam are own-account vendors ILO (2018a). In other words, a more educated person has a higher probability than a less-well educated person of choosing self-employment, which is illustrated in the studies of Rees and Shah (1986), Borjas and Bronars (1989) and D. Evans and Leighton (1989) in the context of developed countries. In the wave 2002, we also get some similar results (see Table 4.4).

Table 4.5: **Probability of employment status, pool model**

	Male			Female		
	Wage/Salary	**Self-employment**	**Not working**	**Wage/Salary**	**Self-employment**	**Not working**
	(1)	(2)	(3)	(4)	(5)	(6)
Age	0.019***	0.010	-0.029***	0.026***	0.020***	-0.046***
	(0.007)	(0.006)	(0.003)	(0.006)	(0.006)	(0.004)
Age square (/100)	-0.030***	-0.007	0.037***	-0.043***	-0.014*	0.057***
	(0.008)	(0.008)	(0.004)	(0.007)	(0.007)	(0.006)
Birth cohort (Ref: 1966-1971)						
1948-1953	-0.083	-0.003	0.085***	0.056	-0.114**	0.058
	(0.054)	(0.051)	(0.032)	(0.049)	(0.049)	(0.037)
1954-1959	-0.058	-0.006	0.065***	0.031	-0.060*	()0.029
	(0.037)	(0.035)	(0.022)	(0.033)	(0.033)	(0.026)
1960-1965	0.005	-0.009	0.004	0.028	-0.034*	0.006
	(0.023)	(0.022)	(0.016)	(0.021)	(0.021)	(0.016)
1972-1979	0.042*	-0.025	-0.017	0.022	-0.002	-0.020
	(0.024)	(0.023)	(0.015)	(0.021)	(0.022)	(0.018)
1980-1985	0.098**	-0.062***	-0.036	0.020	0.012	-0.032
	(0.043)	(0.041)	(0.025)	(0.038)	(0.039)	(0.030)
1986-1991	0.082	-0.047	-0.035	0.005	0.045	-0.050
	(0.061)	(0.059)	(0.032)	(0.054)	(0.056)	(0.043)
Education (Ref: No education)						
Primary	0.003	0.019	-0.022**	-0.002	0.028**	-0.026**
	(0.015)	(0.014)	(0.009)	(0.014)	(0.013)	(0.010)
Lower secondary	-0.002	0.018	-0.016	0.035*	-0.014	()-0.021
	(0.020)	(0.018)	(0.012)	(0.018)	(0.018)	(0.014)
Upper secondary	-0.003	-0.033**	0.036***	0.066***	-0.048***	-0.018
	(0.016)	(0.015)	(0.008)	(0.015)	(0.014)	(0.011)
Vocational	0.187***	-0.152***	-0.035***	0.303***	-0.234***	-0.069***
	(0.016)	(0.015)	(0.010)	(0.015)	(0.016)	(0.014)
College or above	0.429***	-0.407***	-0.022**	0.520***	-0.475***	-0.045***
	(0.018)	(0.019)	(0.009)	(0.016)	(0.020)	(0.014)
Non-Kinh group	0.000	0.001	-0.001	-0.000	0.014	-0.013
	(0.021)	(0.019)	(0.011)	(0.020)	(0.019)	(0.016)
Big cities (HaNoi or HCMC)	0.050***	-0.061***	0.011	0.041***	-0.100***	0.059***
	(0.017)	(0.017)	(0.009)	(0.014)	(0.016)	(0.011)
Marital Status (Ref: Single)						
Married	0.033*	0.093***	-0.126***	-0.056***	0.089***	-0.033***
	(0.017)	(0.017)	(0.009)	(0.015)	(0.016)	(0.011)
Separated/Divorced/Widowed	0.059	-0.027	-0.032**	0.027	0.035	-0.062***
	(0.036)	(0.035)	(0.016)	(0.023)	(0.023)	(0.017)
Number of children under 6	-0.010	0.012	-0.002	-0.030***	0.001	0.029***
	(0.011)	(0.010)	(0.008)	(0.010)	(0.010)	(0.007)
Presence of the elderly aged 60+	0.011	-0.012	0.000	0.021	-0.010	-0.011
	(0.014)	(0.014)	(0.007)	(0.013)	(0.013)	(0.010)
Children under 6 * Elderly aged 60+	-0.010	0.004	0.006	0.022	-0.027	0.005
	(0.018)	(0.017)	(0.011)	(0.016)	(0.017)	(0.012)
Region fixed effects		Yes			Yes	
Wave fixed effects		Yes			Yes	
Observations		10,865			11,422	
Pseudo R2		0.0830			0.0713	

Note: Standard errors are reported in parentheses. The sample are re-weighted.

Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Source: Authors' calculations from VHSS 2002, 2008, 2014.

Gender differences are also apparent across regions. In general, both males and females are more likely to work in the wage/ salary sector and less likely to work in self-employment in other urban regions relative to the Central Highland region. However, it is surprising that the propensity to not work in Ho Chi Minh City and Ha Noi capital, the nation's two largest cities, is significantly positive for females in both waves. On the other hand, the propensity of female working in self-employment is significant negative. This is unexpected as one would expect more job opportunities in both wage/salary employment or self-employment in these cities. Furthermore, ethnicity is also a marginal significant part of working decision. The effect of non-Kinh ethnicity on the propensity to being self-employed is significant for males, at around 4.1 percent in 2002, but not significant for females.

To some extent, health status and family matters such as marital status, number of children under age-6 and the presence of relatives over age-60, also have some effects on employment choice. In particular, with regard to health status, health problems are associated with a statistically significant 7-percentage point increase in the probability of not working for males. In terms of marital status, being married is positively correlated for both males and females to being active in the labour force in relation to single workers. This is illustrated by the statistically significant drop in probability of not working by around 8 percent for females and 10 percent for males (see Table 4.3). Women ever married are more likely to work in self-employment whereas married men are more likely to work in either wage employment (see Table 4.3) or self employment (see Table 4.4)

The influence of children under age-6 on employment choice should be noted. Whilst having no effect on the probability of entering self-employment, an additional child under age-6 is associated with a fall in the probability of wage/salary employment of approximately 6 percent for females and 3 percent for males in 2014. This result is consistent with Becker (1985) who suggests the decline of the probability of being employed among mothers with very young children because of intensive child care and supervision. In contrast, in 2002, an additional child under 6 is associated with an increase in the probability of men working in the wage salaried employment. At some circumstances, it reflects the evolution of the gender role in child caring. In the past, men are believed to be the main working person providing the main household income. Therefore, having additional children gave them more burden, so that they were more likely to work in wage salaried employment for the financial security. However, co-residency with the elderly above 60 years old was another burden for both men with children so that the probability to work in wage salaried employment reduced by 5 percentage points in 2002. On

women'side, they are more likely to work in the wage salaried employment with the presence of the elderly above 60 years regardless of children.

Unlike in the past, nowadays co-residency with elderly family members drops the probability of women self-employed by 9 percentage points, marginally increases the propensity of women working in the wage salaried employment by 5 percentage points, and marginally increases the propensity of women not working by 4 percentage points (see Table 4.3). This may be because grandparents or the elderly family members caring for grandchildren have been quite common experience for many families in Vietnam. In short, when the child care is shared with the elderly aged above 60, women are more likely to exit self-employment and partly move into the salaried employment or partially become not-working. It may be explained by the fact that due to the limited resources, most of public kindergarten schools in Vietnam have rejected kids under one year old to get in school. Therefore, public childcare for children under 6 months old should be considered.

Furthermore, we also estimate separate probits for the decision whether to work or not work (shown in Table 4.6), and the decision to work in the wage salaried sector or the self-employment sector conditional on working (shown in Table 4.7). We can see that age does matter the decision whether to work or not work, and the birth cohort born before 1968 are more likely to work because they are in working-age group. The higher educated men and women are more likely to work in the wage salaried employment. Health problem is a constraint for both men and women to work. Family composition is another constraint for women not to work, but not for men. However, co-residency with elderly family members, who take care of children, is useful, and the probability of women working in the wage salaried employment is increasing significantly.

Table 4.6: **Probability of working (vs. not working), by survey**

	Year 2014		**Year 2002**		**Year 2014**		**Year 2002**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Age	0.305***	0.208***	0.293***	0.244***	0.310***	0.240***	0.296***	0.252***
	(0.059)	(0.045)	(0.033)	(0.025)	(0.062)	(0.046)	(0.033)	(0.026)
Age square (/100)	-0.424***	-0.292***	-0.395***	-0.315***	-0.429***	-0.335***	-0.400***	-0.325***
	(0.084)	(0.064)	(0.039)	(0.030)	(0.088)	(0.064)	(0.039)	(0.031)
Born before 1968	0.573**	0.334***	-0.314*	-0.104	0.551*	0.362**	-0.297**	-0.099
	(0.239)	(0.167)	(0.134)	(0.088)	(0.252)	(0.168)	(0.134)	(0.090)
Education (Ref: no education)								
Primary	0.143	0.223*	0.097	0.045	0.203	0.216	0.112	0.052
	(0.197)	(0.131)	(0.079)	(0.049)	(0.196)	(0.135)	(0.080)	(0.050)
Lower Secondary	0.229	0.158	-0.372	0.297	0.341*	0.139	-0.372	0.294
	(0.196)	(0.131)	(0.239)	(0.244)	(0.200)	(0.135)	(0.240)	(0.250)
Upper secondary	-0.294	0.127	-0.287***	0.025	-0.155	0.111	-0.291***	0.024
	(0.196)	(0.131)	(0.239)	(0.244)	(0.193)	(0.143)	(0.067)	(0.057)
Vocational	0.452**	0.336**	0.274***	0.475***	0.618***	0.368**	0.274***	0.445***
	(0.211)	(0.156)	(0.093)	(0.078)	(0.216)	(0.160)	(0.094)	(0.079)
College or above	0.286	0.667***	0.309***	0.534***	0.414**	0.660***	0.315***	0.539***
	(0.194)	(0.142)	(0.089)	(0.077)	(0.197)	(0.146)	(0.090)	(0.078)
Big cities	-0.227	-0.403***	-0.081	-0.245***	-0.516	-0.148	-0.063	-0.133
	(0.149)	(0.102)	(0.081)	(0.063)	(0.352)	(0.191)	(0.158)	(0.100)
Non-Kinh ethnicity	0.165	0.160	0.102	0.037	0.037	0.260	0.163	0.062
	(0.183)	0.164	(0.117)	(0.085)	(0.193)	(0.164)	(0.117)	(0.089)
Health problem	-0.676***	-0.138	-	-	-0.729***	-0.206	-	-
	(0.155)	(0.135)	-	-	(0.161)	(0.138)	-	-
Marital status (Ref: Single)								
Married	0.952***	0.437***	0.939***	0.008	0.993***	0.402**	0.949***	0.003
	(0.137)	(0.106)	(0.091)	(0.060)	(0.138)	(0.107)	(0.091)	(0.061)
Separated/Divorced/Widowed	0.135	0.498***	0.184	0.063	0.193	0.495***	0.159	0.053
	(0.225)	(0.163)	(0.165)	(0.091)	(0.231)	(0.166)	(0.167)	(0.092)
Number of children under 6	-0.106	-0.223***	0.291***	-0.085**	-0.137	-0.227***	0.308***	-0.090**
	(0.098)	(0.070)	(0.085)	(0.041)	(0.102)	(0.070)	(0.084)	(0.041)
Presence of the elderly over 60	-0.045	0.122	-0.032	0.066	-0.026	0.117	-0.023	0.077
	(0.116)	(0.099)	(0.067)	(0.054)	(0.123)	(0.100)	(0.067)	(0.055)
Children under 6 x Elderly aged 60+	0.174	-0.208*	-0.032	0.066	0.215	-0.200*	-0.300***	-0.047
	(0.162)	(0.111)	(0.112)	(0.066)	(0.173)	(0.112)	(0.111)	(0.066)
Region fixed effects	Yes	Yes	Yes	Yes	-	-	-	-
Province fixed effects	-	-	-	-	Yes	Yes	Yes	Yes
Observation	2,397	2,583	6,429	6,670	2,352	2,583	6,390	6,670
R-squared	0.204	0.091	0.168	0.076	0.243	0.115	0.181	0.096

Note: Robust standard errors are reported in parenthesis.

Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Source: Authors' calculations from VHLSS 2014, and 2002

Table 4.7: **Probability of working in the wage employment (vs. self-employment), by survey**

	Year 2014		**Year 2002**		**Year 2014**		**Year 2002**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Age	-0.016	0.030	-0.023	-0.067***	-0.033	0.025	-0.022	-0.073***
	(0.045)	(0.044)	(0.025)	(0.025)	(0.045)	(0.045)	(0.025)	(0.025)
Age square (/100)	-0.020	-0.075	0.005	0.056*	-0.001	-0.069	0.002	0.061**
	(0.084)	(0.064)	(0.039)	(0.030)	(0.062)	(0.062)	(0.030)	(0.030)
Born before 1968	0.111	0.012	-0.048	0.019	0.119	0.007	-0.048	0.038
	(0.141)	(0.150)	(0.074)	(0.075)	(0.143)	(0.152)	(0.074)	(0.077)
Education (Ref: no education)								
Primary	-0.096	0.050	-0.064	-0.141***	-0.109	-0.035	-0.068	-0.146***
	(0.121)	(0.124)	(0.047)	(0.050)	(0.124)	(0.127)	(0.048)	(0.051)
Lower Secondary	-0.127	0.208*	0.030	0.436**	-0.176	0.140	0.051	0.493**
	(0.120)	(0.124)	(0.199)	(0.195)	(0.123)	(0.127)	(0.205)	(0.193)
Upper secondary	0.029	0.379***	0.157***	0.266***	-0.015	0.298**	0.146***	0.250***
	(0.128)	(0.129)	(0.051)	(0.053)	(0.132)	(0.133)	(0.052)	(0.054)
Vocational	0.522***	1.287***	0.651***	1.050***	0.459***	1.228***	0.656***	1.091***
	(0.123)	(0.144)	(0.055)	(0.058)	(0.127)	(0.148)	(0.056)	(0.059)
College or above	1.341***	1.974***	1.139***	1.620***	1.290***	1.963***	1.147***	1.624***
	(0.137)	(0.139)	(0.061)	(0.072)	(0.140)	(0.144)	(0.062)	(0.073)
Big cities	0.093	0.197*	0.357***	0.344***	0.677***	0.922***	0.464***	0.482***
	(0.101)	(0.105)	(0.060)	(0.060)	(0.248)	(0.263)	(0.153)	(0.177)
Non-Kinh ethnicity	-0.151	0.082	-0.115	-0.064	-0.247**	0.050	-0.158**	-0.019
	(0.115)	0.119	(0.073)	(0.078)	(0.119)	(0.122)	(0.075)	(0.081)
Health problem	-0.030	-0.041	-	-	0.027	0.124	-	-
	(0.151)	(0.143)	-	-	(0.154)	(0.146)	-	-
Marital status (Ref: Single)								
Married	0.095	-0.087	-0.203***	-0.260***	0.137	-0.092	-0.205***	-0.238***
	(0.110)	(0.117)	(0.060)	(0.058)	(0.114)	(0.118)	(0.060)	(0.059)
Separated/Divorced/Widowed	0.355*	0.198	-0.129	-0.041	0.342*	0.176	-0.129	-0.027
	(0.201)	(0.158)	(0.139)	(0.089)	(0.205)	(0.159)	(0.142)	(0.090)
Number of children under 6	-0.090	-0.169**	0.015	-0.033	-0.059	-0.160**	0.012	-0.040
	(0.062)	(0.072)	(0.038)	(0.042)	(0.063)	(0.072)	(0.039)	(0.042)
Presence of the elderly over 60	0.085	-0.083	0.021	0.091*	0.115	-0.085	0.027	0.086*
	(0.088)	(0.090)	(0.050)	(0.051)	(0.090)	(0.091)	(0.050)	(0.052)
Children under 6 x Elderly aged 60+	0.083	0.289**	-0.083	-0.037	0.021	0.284**	-0.084	-0.027
	(0.104)	(0.120)	(0.063)	(0.069)	(0.106)	(0.122)	(0.064)	(0.071)
Region fixed effects	Yes	Yes	Yes	Yes	-	-	-	-
Province fixed effects	-	-	-	-	Yes	Yes	Yes	Yes
Observation	2,227	2,268	5,962	5,661	2,227	2,268	5,962	5,661
R-squared	0.162	0.274	0.112	0.181	0.185	0.299	0.124	0.196

Note: Robust standard errors are reported in parenthesis.

Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Source: Authors' calculations from VHLSS 2014, and 2002

As discussed in the previous section, one limitation of multinomial logit model is the IIA assumption, which means that, all else being equal, a person's choice between two or more than two alternative outcomes in unaffected by what other choices are available. Therefore, in this paper, we check the robustness of the results by relaxing the IIA property. In particular, we use the multinomial probit model, which allows for arbitrary correlation in the unobserved errors across employment sectors, instead. Table 4.12 and Table 4.11 in Appendix present the estimation results of the multinomial probit model. In spite of some variations in marginal effects of these control variables on the probabilities of being in each employment sector, these variations seems minimal. We, therefore, get fairly similar results in comparison with the results of the multinomial logit model.

4.6.2 Simulation results

We next consider how gender, other things being equal, is associated with the probability of being in each different employment sectors. In particular, we use the coefficients of the male model to calculate the predicted probability for each female in the sample in each different employment sector. The simulation results are shown in Table 4.8, which captures the behavioural choice of female in employment sectors when they are treated like males. In addition, we also test the statistical significance of the difference between the predicted figures and the actual figures by running the bootstrap.

Table 4.8: **Simulation results**

	Male		Female		Total	
	Observations	**%**	**Observations**	**%**	**Observations**	**%**
Year 2014						
Wage/Salary						
+ Actual	1,393	58.1%	1,220	47.2%	2,613	100%
+ Predicted, if male	-	-	1,495	57.9%		
The difference			-275***	-10.7%		
			(47.69)			
Self-employment						
+ Actual	834	34.8%	1,048	40.6%	1,882	100%
+ Predicted, if male	-	-	913	35.3%		
The difference			135***	5.3%		
			(54.20)			
Not working						
+ Actual	170	7.1%	315	12.2%	485	100%
+ Predicted, if male	-	-	175	6.8%		
The difference			140***	5.4%		
			(28.52)			
Total	**2,397**		**2,583**		**4,980**	
Year 2002						
Wage/Salary						
+ Actual	3,406	53,0%	2,354	35.3%	5,760	100%
+ Predicted, if male	-	-	3,402	51.0%		
The difference			-1,048***	-10.7%		
			(76.93)			
Self-employment						
+ Actual	2,556	39.8%	3,307	49.6%	5,863	100%
+ Predicted, if male	-	-	2,791	41.8%		
The difference			516***	7.8%		
			(75.86)			
Not working						
+ Actual	467	7.3%	1,009	15.1%	1476	100%
+ Predicted, if male	-	-	477	7.2%		
The difference			532***	7.9%		
			(57.29)			
Total	**6,429**		**6,670**		**13,099**	

Note: The simulation results are calculated by using males' coefficients.

The difference refers to the difference between the actual figure and the predicted figure.

Standard errors of the differences which are tested by bootstrap are reported in parenthesis.

*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Source: Authors' calculations from VHLSS 2014 and 2002.

When using the coefficients of males to predict the probability of females in each employment sector, the simulation result shows that in 2014, around 58 per cent and 35 per cent of females in our analyses would be wage-earners and self-employed workers, respectively while approximately 7 per cent of females would be unemployed. There is a substantial difference between the predicted probabilities and these actual figures, which are estimated to be around 10 percentage points difference in wage/salaried sector and around 5 percentage point difference in either self-employed sector or not-working. This difference is also statistically significant at 1% level. In addition, we also find a significant difference between men and women in their employment allocation back in 2002. This suggests a profound pattern in Vietnamese labour market that males tend to work in wage/salaried sector whereas females tend to work in self-employment, which is also consistent with Pierre (2012) and Serrano (2014) supporting the flexibility that self-employment may offer for female workers. However, in practice, most self-employment jobs in Vietnam are own-account vendors, which reflects the insecurity rather than the flexibility (ILO, 2018a), which resonates with the simulation results showing that females would work in wage/salary sector if the process of employment allocation for females were exactly the same as that for males.

4.7 Conclusion

This paper uses the VHLSS to investigate the gender difference in employment allocation in urban Vietnam. Descriptive statistics suggest that the gender gap in three labour force categories has been quite persistent over time since 2002. The favourable gap in wage/salary employment for men has been reduced by around 6 percentage points which is offset by increases in the gaps in self-employment and not-working. We also witness a moderate shift in the employment structure out of self-employment into wage/salary employment, to a greater extent to women and to a lesser extent to men.

The results suggest that education is a key factor of the employment choice. Education helps to pull both men and women out of not working. Having a higher level of education increases the propensity for both men and women to enter wage/salary sector. It is also noted that there is a marked pattern of employment by age, which is consistent with the study of Demombynes and Testaverde (2018) showing that young workers from 22 to 32 years old are more likely to work in the wage/salary sector while older workers, who entered the labour market before the structural transformation was initiated, are still principally self-employed (Demombynes & Testaverde, 2018). Ethnicity is also significant in employment

allocation. The non-Kinh group are more likely to be self-employed, which is consistent with the study of Demombynes and Testaverde (2018). We also find that child care decreases the probability of being in the wage salaried sector for both genders. However, sharing child care with the elderly in the household may be the way for women to exit the self-employment to be wage-earners.

In practice, there was a change in maternity leave which has extended, on average, from 4 months to 6 months right at the beginning of 2014, which has given mothers more time to take care of their children. However, most of kindergarten schools in Vietnam rejected kids under one year old to get in school due to the limited resources. By the academic year 2014/2015, Ho Chi Minh City was the first city which has allowed parents to send their children over 6 months old (i.e. right after the maternity leave) to the public kindergarten schools. They, thereby, can go to work without the financial burden of private kindergarten schools. Therefore, it is necessary to improve the free public child care, which makes people (especially women) carefree in order to get to work, particularly getting involved in the wage salaried employment. Now, most provinces around Vietnam allow parents to send their children 6 months old to the public kindergarten by the end of 2020. Nonetheless, it would be still a problem if parents sent their children earlier before they were 6 months old.

In addition, we also find that a disproportionate fraction of women workers works outside the wage salaried sector despite having the same observed characteristics of men working in this sector. However, in practice, most self-employment jobs in Vietnam are own-account vendors, which reflects the insecurity rather than the flexibility (ILO, 2018a), which resonates with the simulation results showing that females would work in wage/salary sector if the process of employment allocation for females were exactly the same as that for males.

4.A Appendix

4.A.1 Introduction to household survery data

In order to evaluate the living standards for policy and socio-economic plan making, the General Statistics Office (GSO) with the technical support from the World Bank in Vietnam has conducted many household living standards surveys, which are nationally represented. They are conducted every 2 years by the GSO in the years end with even numbers. The 1992/93 and 1997/98 surveys are known as the Vietnam Living Standards Surveys (VLSS). From 2002 till now, they were renamed the Vietnam Household Living Standards Surveys (VHLSS).

In generally, the survey consists of major contents reflecting household's living standard and the basic social-economic conditions in the commune/ward that affect on the living standards of residents. In fact, VHLSS consists two surveys including household-level and commune-level surveys, which cover individual's characteristics and commune's characteristics. Therefore, VHLSS is a comprehensive survey conducted in the whole country, spreading through 63 provinces and cities under management (called province/city).

The VHLSS data have been widely analysed by the Government of Vietnam, international donors, and researchers for insights into different policies.

4.A.2 Multinomial logit estimations with province fixed effects

Table 4.9: **Probability of employment choice, by gender, year 2014 - Multinomial logit model - province fixed effects**

	Male						**Female**					
	Wage/Salary		**Self-employment**		**Not working**		**Wage/Salary**		**Self-employment**		**Not working**	
	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err
Age	0.015	0.014	0.019	0.013	-0.034***	0.007	0.029**	0.012	0.016	0.012	-0.044***	0.008
Age square (/100)	-0.033*	0.019	-0.013	0.018	0.047***	0.010	-0.049***	0.017	-0.013	0.016	0.062***	0.012
Born before 1968	0.073	0.046	-0.019	0.042	-0.054*	0.030	0.031	0.043	0.031	0.041	-0.061*	0.034
Education (Reference: No education)												
Primary	-0.020	0.039	0.041	0.036	-0.022	0.022	0.010	0.036	0.032	0.032	-0.041*	0.024
Secondary	-0.032	0.039	0.068*	0.036	-0.036*	0.022	0.049	0.036	-0.021	0.032	-0.028	0.024
Highschool	-0.024	0.041	0.009	0.038	0.015	0.021	0.084***	0.037	-0.058*	0.034	-0.026	0.025
Vocational	0.172***	0.040	-0.103***	0.037	-0.069***	0.024	0.336***	0.038	-0.278***	0.038	-0.057**	0.028
College or above	0.408***	0.042	-0.383***	0.041	-0.025	0.021	0.531***	0.035	-0.475***	0.037	-0.056**	0.026
Non-Kinh group	-0.072*	0.038	0.075**	0.036	-0.004	0.021	0.030	0.036	0.018	0.035	-0.048	0.030
Health problem	-0.024	0.044	-0.049	0.042	0.073***	0.016	0.015	0.037	-0.054	0.037	0.039	0.026
Marital status (Reference: Single)												
Married	0.098***	0.033	0.006	0.032	-0.104***	0.015	0.005	0.029	0.067**	0.030	-0.072***	0.018
Divorced/Separated/Widowed	0.107*	0.061	-0.087	0.059	-0.020	0.024	0.073*	0.041	0.021	0.041	-0.093***	0.030
Number of children under 6	-0.026	0.020	0.011	0.018	0.015	0.011	-0.054***	0.018	0.011	0.018	0.042***	0.013
Presence of the elderly aged 60+	0.029	0.027	-0.032	0.026	0.004	0.013	-0.004	0.024	0.023	0.024	-0.020	0.019
Children under 6 x Elderly aged 60+	0.020	0.033	0.002	0.032	-0.022	0.019	0.048	0.030	-0.081**	0.031	0.033*	0.020
Province fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	2397						2583					
LR chi2	861.23						1170.75					
Pseudo R2	0.2064						0.2320					

Note: Standard errors are next to marginal effects. Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Source: Author's calculations from VHLSS 2014

Table 4.10: **Probability of employment choice, by gender, year 2002 - Multinomial logit model - province fixed effects**

	Male						**Female**					
	Wage/Salary		**Self-employment**		**Not working**		**Wage/Salary**		**Self-employment**		**Not working**	
	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err
Age	0.018**	0.008	0.016**	0.008	-0.035***	0.004	0.004	0.007	0.049***	0.007	-0.053***	0.005
Age square (/100)	-0.033***	0.010	-0.014	0.010	0.047***	0.005	-0.014*	0.008	-0.055***	0.009	0.069***	0.006
Born before 1968	0.042*	0.025	0.005	0.024	0.037**	0.016	0.002	0.022	-0.021	0.023	0.020	0.019
Education (Reference: No education)												
Primary	-0.011	0.016	0.029*	0.015	-0.018*	0.009	-0.036**	0.015	0.045***	0.015	-0.009	0.010
Secondary	-0.013	0.067	-0.034	0.064	0.047*	0.028	0.153***	0.055	-0.092	0.063	-0.061	0.058
Highschool	0.021	0.017	-0.055***	0.016	0.034***	0.008	0.065***	0.015	-0.061***	0.016	-0.004	0.012
Vocational	0.231***	0.018	-0.197***	0.018	-0.034***	0.012	0.323***	0.015	-0.242***	0.019	-0.081***	0.018
College or above	0.386***	0.020	-0.363***	0.020	-0.022**	0.010	0.452***	0.017	-0.418***	0.024	-0.034*	0.018
Non-Kinh group	-0.037	0.025	0.057**	0.024	-0.020	0.014	-0.001	0.023	0.016	0.024	-0.014	0.019
Marital status (Reference: Single)												
Married	0.002	0.020	0.116***	0.019	-0.117***	0.011	-0.058***	0.016	0.059***	0.018	-0.001	0.013
Divorced/Separated/Widowed	-0.031	0.046	0.056	0.044	-0.025	0.018	-0.001	0.025	0.012	0.027	-0.011	0.020
Number of children under 6	0.028**	0.014	0.009	0.013	-0.037***	0.011	-0.018	0.012	-0.000	0.012	0.018**	0.009
Presence of the elderly aged 60+	0.009	0.017	-0.011	0.016	0.002	0.008	0.032**	0.014	-0.013	0.016	-0.018	0.012
Children under 6 x Elderly aged 60+	-0.051**	0.022	0.013	0.021	0.038**	0.014	-0.008	0.019	-0.004	0.020	0.012	0.014
Province fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	6429						6670					
LR chi2	1633.19						2052.21					
Pseudo R2	0.1421						0.1537					

Note: Standard errors are next to marginal effects. Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Source: Author's calculations from VHLSS 2014

4.A.3 Robust check for IIA assumption - Multinomial probit estimations

Table 4.11: **Probability of employment choice, by gender, year 2014 - Multinomial probit model**

	Male						**Female**					
	Wage/Salary		**Self-employment**		**Not working**		**Wage/Salary**		**Self-employment**		**Not working**	
	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err
Age	0.014	0.016	0.016	0.015	-0.030***	0.006	0.039**	0.016	0.005	0.016	-0.044***	0.010
Age square (/100)	-0.034	0.022	-0.008	0.021	0.042***	0.009	-0.065***	0.023	0.003	0.022	0.063***	0.014
Born before 1968	0.063	0.050	-0.018	0.049	-0.045**	0.016	0.031	0.058	0.028	0.055	-0.060**	0.031
Education (Reference: No education)												
Primary	-0.027	0.045	0.039	0.044	-0.012	0.016	0.036	0.047	0.009	0.043	-0.045**	0.022
Secondary	-0.035	0.045	0.054	0.044	-0.019	0.015	0.089*	0.047	-0.052	0.042	-0.037	0.024
Highschool	-0.012	0.048	-0.021	0.044	0.033	0.026	0.148***	0.047	-0.110***	0.042	-0.038	0.024
Vocational	0.189***	0.038	-0.153***	0.036	-0.036***	0.012	0.416***	0.033	-0.332***	0.026	-0.084***	0.018
College or above	0.377***	0.028	-0.354***	0.026	-0.023	0.014	0.589***	0.026	-0.481***	0.022	-0.107***	0.017
Non-Kinh group	-0.051	0.045	0.063	0.044	-0.013	0.015	0.034	0.048	-0.004	0.046	-0.030	0.028
Health problem	-0.056	0.051	-0.045	0.045	0.101***	0.036	0.001	0.050	-0.028	0.046	0.028	0.034
Big cities (Ha Noi or Ho Chi Minh City)	0.022	0.035	-0.045	0.034	0.022	0.017	0.012	0.036	-0.117***	0.033	0.106***	0.029
Marital status (Reference: Single)												
Married	0.124***	0.039	0.023	0.036	-0.148***	0.029	0.028	0.038	0.084**	0.036	-0.112***	0.030
Divorced/Separated/Widowed	0.118**	0.059	-0.105*	0.058	-0.013	0.017	0.105*	0.054	-0.020	0.053	-0.085***	0.018
Number of children under 6	-0.038*	0.022	0.027	0.021	0.011	0.009	-0.073***	0.024	0.026	0.023	0.047***	0.014
Presence of the elderly aged 60+	0.026	0.030	-0.028	0.029	0.003	0.012	-0.005	0.032	0.032	0.032	-0.027	0.019
Children under 6 x Elderly aged 60+	0.042	0.038	-0.026	0.037	-0.016	0.016	0.062	0.041	-0.108***	0.040	0.046*	0.023
Region fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	2397						2583					

Note: Standard errors are next to marginal effects. Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Source: Author's calculations from VHLSS 2014

Table 4.12: **Probability of employment choice, by gender, year 2002 - Multinomial probit model**

	Male						**Female**					
	Wage/Salary		**Self-employment**		**Not working**		**Wage/Salary**		**Self-employment**		**Not working**	
	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err
Age	0.007	0.010	0.022**	0.010	-0.029***	0.003	0.002	0.009	0.056***	0.010	-0.058***	0.006
Age square (/100)	-0.020	0.012	-0.020*	0.012	0.039***	0.004	-0.013	0.011	-0.063***	0.012	0.076***	0.007
Born before 1968	-0.036	0.028	0.008	0.027	0.028**	0.012	-0.007	0.027	-0.018	0.028	0.025	0.019
Education (Reference: No education)												
Primary	-0.020	0.018	0.028	0.018	-0.009	0.007	-0.043***	0.017	0.049***	0.017	-0.006	0.012
Secondary	-0.019	0.077	-0.033	0.071	0.052	0.047	0.178**	0.072	-0.112	0.070	-0.066*	0.040
Highschool	0.035*	0.019	-0.068***	0.018	0.033***	0.010	0.091***	0.019	-0.079***	0.019	-0.012	0.013
Vocational	0.236***	0.017	-0.210***	0.016	-0.026***	0.006	0.403***	0.019	-0.305***	0.019	-0.099***	0.011
College or above	0.361***	0.014	-0.334***	0.014	-0.026**	0.006	0.540***	0.016	-0.443***	0.016	-0.097***	0.011
Non-Kinh group	-0.039	0.028	0.048*	0.027	-0.009	0.010	-0.012	0.028	0.026	0.028	-0.014	0.020
Big cities	0.122***	0.021	-0.129***	0.020	0.007	0.009	0.083***	0.021	-0.145***	0.021	0.062***	0.017
Marital status (Reference: Single)												
Married	0.014	0.023	0.124***	0.020	-0.138***	0.017	-0.076***	0.020	0.079**	0.021	-0.003	0.014
Divorced/Separated/Widowed	-0.037	0.050	0.052	0.051	-0.015	0.012	0.007	0.031	0.017	0.031	-0.024	0.020
Number of children under 6	0.028*	0.015	0.001	0.014	-0.029***	0.008	-0.016	0.014	-0.004	0.014	0.020**	0.010
Presence of the elderly aged 60+	0.009	0.018	-0.011	0.018	0.002	0.007	0.040**	0.018	-0.022	0.018	-0.018	0.012
Children under 6 x Elderly aged 60+	-0.051**	0.024	0.022	0.024	0.029***	0.011	-0.017	0.023	0.005	0.024	0.011	0.016
Region fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	6429						6670					

Note: Standard errors are next to marginal effects. Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Source: Author's calculations from VLSS 2002

Table 4.13: **Probability of employment choice, by gender, year 2014 - Multinomial probit model, province fixed effects**

	Male						**Female**					
	Wage/Salary		**Self-employment**		**Not working**		**Wage/Salary**		**Self-employment**		**Not working**	
	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err
Age	0.002	0.016	0.016	0.015	-0.030***	0.006	0.039**	0.016	0.005	0.016	-0.044***	0.010
Age square (/100)	-0.034	0.022	-0.008	0.021	0.042***	0.009	-0.065***	0.023	0.003	0.022	0.063***	0.014
Born before 1968	0.063	0.050	-0.018	0.049	-0.045**	0.016	0.031	0.058	0.028	0.055	-0.060**	0.031
Education (Reference: No education)												
Primary	-0.027	0.045	0.039	0.044	-0.012	0.016	0.036	0.047	0.009	0.043	-0.045**	0.022
Secondary	-0.035	0.045	0.054	0.044	-0.019	0.015	0.089*	0.047	-0.052	0.042	-0.037	0.024
Highschool	-0.012	0.048	-0.021	0.044	0.033	0.026	0.148***	0.047	-0.110***	0.042	-0.038	0.024
Vocational	0.189***	0.038	-0.153***	0.036	-0.036***	0.012	0.416***	0.033	-0.332***	0.026	-0.084***	0.018
College or above	0.377***	0.028	-0.354***	0.026	-0.023	0.014	0.589***	0.026	-0.481***	0.022	-0.107***	0.017
Non-Kinh group	-0.051	0.045	0.063	0.044	-0.013	0.015	0.034	0.048	-0.004	0.046	-0.030	0.028
Health problem	-0.056	0.051	-0.045	0.045	0.101***	0.036	0.001	0.050	-0.028	0.046	0.028	0.034
Big cities (Ha Noi or Ho Chi Minh City)	0.022	0.035	-0.045	0.034	0.022	0.017	0.012	0.036	-0.117***	0.033	0.106***	0.029
Marital status (Reference: Single)												
Married	0.124***	0.039	0.023	0.036	-0.148***	0.029	0.028	0.038	0.084**	0.036	-0.112***	0.030
Divorced/Separated/Widowed	0.118**	0.059	-0.105*	0.058	-0.013	0.017	0.105*	0.054	-0.020	0.053	-0.085***	0.018
Number of children under 6	-0.038*	0.022	0.027	0.021	0.011	0.009	-0.073***	0.024	0.026	0.023	0.047***	0.014
Presence of the elderly aged 60+	0.026	0.030	-0.028	0.029	0.003	0.012	-0.005	0.032	0.032	0.032	-0.027	0.019
Children under 6 x Elderly aged 60+	0.042	0.038	-0.026	0.037	-0.016	0.016	0.062	0.041	-0.108***	0.040	0.046*	0.023
Province fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	2397						2583					

Note: Standard errors are next to marginal effects. Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Source: Author's calculations from VHLSS 2014

Table 4.14: **Probability of employment choice, by gender, year 2002 - Multinomial probit model, province fixed effects**

	Male						**Female**					
	Wage/Salary		**Self-employment**		**Not working**		**Wage/Salary**		**Self-employment**		**Not working**	
	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err	dy/dx	S.Err.	dy/dx	S.Err	dy/dx	S.Err
Age	0.007	0.010	0.022**	0.010	-0.029***	0.003	0.002	0.009	0.056***	0.010	-0.058***	0.006
Age square (/100)	-0.020	0.012	-0.020*	0.012	0.039***	0.004	-0.013	0.011	-0.063***	0.012	0.076***	0.007
Born before 1968	-0.036	0.028	0.008	0.027	0.028**	0.012	-0.007	0.027	-0.018	0.028	0.025	0.019
Education (Reference: No education)												
Primary	-0.020	0.018	0.028	0.018	-0.009	0.007	-0.043***	0.017	0.049***	0.017	-0.006	0.012
Secondary	-0.019	0.077	-0.033	0.071	0.052	0.047	0.178**	0.072	-0.112	0.070	-0.066*	0.040
Highschool	0.035*	0.019	-0.068***	0.018	0.033***	0.010	0.091***	0.019	-0.079***	0.019	-0.012	0.013
Vocational	0.236***	0.017	-0.210***	0.016	-0.026***	0.006	0.403***	0.019	-0.305***	0.019	-0.099***	0.011
College or above	0.361***	0.014	-0.334***	0.014	-0.026**	0.006	0.540***	0.016	-0.443***	0.016	-0.097***	0.011
Non-Kinh group	-0.039	0.028	0.048*	0.027	-0.009	0.010	-0.012	0.028	0.026	0.028	-0.014	0.020
Big cities	0.122***	0.021	-0.129***	0.020	0.007	0.009	0.083***	0.021	-0.145***	0.021	0.062***	0.017
Marital status (Reference: Single)												
Married	0.014	0.023	0.124***	0.020	-0.138***	0.017	-0.076***	0.020	0.079**	0.021	-0.003	0.014
Divorced/Separated/Widowed	-0.037	0.050	0.052	0.051	-0.015	0.012	0.007	0.031	0.017	0.031	-0.024	0.020
Number of children under 6	0.028*	0.015	0.001	0.014	-0.029***	0.008	-0.016	0.014	-0.004	0.014	0.020**	0.010
Presence of the elderly aged 60+	0.009	0.018	-0.011	0.018	0.002	0.007	0.040**	0.018	-0.022	0.018	-0.018	0.012
Children under 6 x Elderly aged 60+	-0.051**	0.024	0.022	0.024	0.029***	0.011	-0.017	0.023	0.005	0.024	0.011	0.016
Province fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	6429						6670					

Note: Standard errors are next to marginal effects. Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Source: Author's calculations from VLSS 2002

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Appendix 6B: Statement of Authorship

This declaration concerns the article entitled:			
The Role of Selection Bias in Sectoral Allocation and The Gender Wage Gap in Urban Vietnam			
Publication status (tick one) **Draft manuscript** [x] **Submitted** [ ] **In review** [ ] **Accepted** [ ] **Published** [ ]			
Publication details (reference)			
Copyright status (tick the appropriate statement) I hold the copyright for this material [x] Copyright is retained by the publisher, but I have been given permission to replicate the material here [ ]			
Candidate's contribution to the paper (provide details, and also indicate as a percentage)	The considerably contributed to the following components of the research, according to the following percentages: Formulation of ideas: - Formulation of the research question (80%) - Collection and study of the relevant literature (85%) Design of methodology: (includes implementation): - Collection and gaining command of the data (including programming to generate analysis dataset) (95%) --Choice of relevant econometric model (85%) --Specification of models (85%) --Estimation of models (95%) --Evaluation of models (80%) Experimental work: N/A Presentation of data in journal format: --Writing of paper (including formulation of structure of paper) (85%)		
Statement from Candidate	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature.		
Signed	Van Phan	**Date**	23/8/2019

Last update: Feb 2019

Chapter 5

The Role of Selection Bias in Sectoral Allocation and The Gender Wage Gap in Urban Vietnam

Van Phan, Thanos Mergoupis, John Sessions

Abstract

This study examines the gender wage gap in urban Vietnam, using the Vietnamese Household Living Standard Survey (VHLSS). Since men are more likely to be employed in the wage-salaried sector while women are more likely to be self-employed, we employ the Heckman two stage and the Dublin and McFadden methods to correct for selectivity bias in employment sectoral allocations. We find that women, on average, earn around 8 percentage points less than men. However, after the selection bias correction, the gender wage gap becomes even bigger, with women earnings around 44 percentage points less than men's. Furthermore, the Oaxaca - Blinder decomposition suggests that differences in observable characteristics do not explain the gap, which is predominately attributable to unexplained factors vis. discrimination.

Keywords: gender, selection bias, wage gap, Vietnam.
JEL classification: J16, J31, J71

5.1 Introduction

One of the key objectives in development policies is inclusive and sustainable economic growth, which can be obtained if wealth is shared and income inequality is addressed well (United Nations (UN), 2015). However, a growing body of evidence, for example, Dollar and Gatti (1999), Klasen (1999), Schafgans (2000), Seguino (2000), Kabeer and Natali (2013), Cavalcanti and Tavares (2016), Elson and Senth (2019) shows that economic growth is a gendered process. In particular, gender inequalities can be barriers to the economic growth, both directly through education, and the labour market, and indirectly through the intergenerational transmission in family relations. Indeed, gender inequalities in education reduce not only the pool of talent by excluding highly qualified females, but also average human capital, thus harming the economic growth in both developed and developing countries (Dollar & Gatti, 1999; Klasen, 1999). This, would then lead to gender gaps in employment where employers give preferences towards educated workers (normally males), and against less-educated workers (normally females) (Klasen & Lamanna, 2009), thus distorting the optimal allocation of talent and reducing growth.

There is less literature on the direct effects of gender wage differentials on economic growth (see Cavalcanti & Tavares, 2016; Doepke & Tertilt, 2014; Klasen, 2018; Schober & Winter-Ebmer, 2011; Seguino, 2000). In particular, if there is discrimination against women in the labour market, then, the gender wage gaps which discourage women from entering the labour market could negatively affect their bargaining power within the household. Therefore, their human capital investments in the next generation might suffer and restrain development. Closing the gender wage gap, it is argued, can help to create a more equal and cohesive society. By valuing skills equally, women will be better motivated to improve their economic independence.

Nonetheless, there are counter-arguments suggesting that the gender gaps may actually promote economic performance, and boost the economic growth (see Doepke & Tertilt, 2014; Seguino, 2000). For example, Seguino (2000) argues that gender wage differentials may act as a stimulus to growth in semi-industrialised export-oriented economies. Women are more likely to cluster in export industries on which most developing countries rely to finance imported intermediate and capital goods in order to relieve a balance of payments constraint to growth (Setterfield, 2006). Thus, the gender wage gap remains an active research area of interest (see Blau & Kahn, 2003, 2017; Olivetti & Petrongolo, 2016; Weichselbaumer & Winter-Ebmer, 2005, 2007, for international perspectives and developed

countries).

On average women earn less than men in both developed and developing countries, although there are substantial variations across regions and countries (ILO, 2013, 2015). Gender differences in labour force participation, education, work experience, labour division, job separation are the main factors driving the gender wage gap (Blau & Kahn, 2017). Another feature more common in developing countries is that a large proportion of people work outside the wage sector. In Vietnam for example, half of all workers are wage and salary employees compared to 85 per cent in high income countries (Gindling & Newhouse, 2014). There are also significant gender differences in the participation in the wage/salaried sector. In Vietnam for example, around 58 per cent of working men compared to 47 per cent of working women are wage-earners (see Table 5.1). This raises the question how non-random selection into wage/salaried employment relates to gender wage gaps, which is the focus of this paper.

This study examines the gender wage gap for the employed workers in urban Vietnam to address three research questions: (i) What are the key determinants of males'and females'earnings? (ii) What is the extent of any gender differences in males'and females'wages? And (iii) Which factors explain the gender wage gap? In particular we are interested in how gender differences in the allocation of the population across the wage/salaried sector, the self-employed sector and non-employment related to the observed wage differences. The most common method to correct selection bias in Vietnamese studies is the Heckman two step technique (see Liu, 2004; Tran, 2015) which only accounts for only two possible labour force statuses. In this paper we control for selection into three states. Using the Vietnamese Household Living Standard Survey (VHLSS), we find that women, on average, earn around 8 percentage points less than men. Controlling for selection bias in different employment sectors we find that the gender wage gap becomes even bigger, with women earnings around 40 percentage points less than men's.

The study is organized as follows: Section 2 reviews empirical studies of the gender wage gap in developing countries generally, and in Vietnam specifically. Section 3 describes the evolution of the employment allocation in urban Vietnam. Section 4 discusses the methodology used in this study whislt Section 5 describes the data, variable construction and descriptive analysis. The results from the estimations are discussed in Section 6 whislt Section 7 concludes and draws some perspectives for further research.

5.2 Literature review

Wage inequalities between males and females exist in almost every country (ILO, 2013, 2015). There are two main plausible explanations for this: (i) Each individual might choose to accumulate different levels of productive skills or human capital; and (ii) Employers might reward their workers for their productive skills differently depending on gender. More specifically, women and men face different choices in the labour market and their expectations, for instance, human capital accumulation, working time, and job segregation, are different. As in other developed countries, women's educational attainment in Vietnam seems higher than men's (Dang & Glewwe, 2018; OECD, 2012). However, child bearing and child rearing may constrain women's efforts to upgrade their skills for their jobs. Alternatively, the gender wage gap may come from the discrimination by employers, particularly, they tend to hire women at lower wages due to their comparative advantage in home production (Albanesi & Olivetti, 2009).

In developing countries and in Asia and Pacific, a rich body of studies on gender wage gap has emerged for last two decades, for example, Yahmed (2018) for Brazil; Akter (1999) and Ahmed and Maitra (2010) for Bangladesh; Bui and Permpoonwiwat (2015) for Thailand; Taniguchi and Tuwo (2014) for Indonesia; Heshmati and Su (2017) for China; and Liu (2004); Pham and Reilly (2007); Tran (2015) for Vietnam. All show that male workers are paid higher wages than their female counterparts. For example, based on the Mincerian wage equation, the male-to-female mean earnings ratio was estimated around 1.95 in urban Bangladesh in 1999/2000 (Ahmed & Maitra, 2010), 1.07 in urban China in 2009 (Heshmati & Su, 2017), and 1.35 in urban Indonesia in 2010 (Taniguchi & Tuwo, 2014), after controlling for individual productivity characteristics, occupation characteristics, and industry characteristics. With regards to Vietnam, the male-female mean earnings ratio was around 1.29 in 1992/1993, 1.21 in 1997/1998, 1.17 in 2002 and 1.18 in 2012 (Liu, 2004; Pham & Reilly, 2007; Tran, 2015).[1]

More importantly, non-random selection into wage salaried employment may explain the gender wage gap because unobserved factors are correlated with observed factors in wage estimation which may cause the OLS estimation biased. In particular, in the context of Vietnamese employment allocation, workers might not have been randomly assigned to the wage salaried employment, self-employment and not-working, which is further discussed in Section 3. Sample selection bias, therefore, would be a potential problem for estimating the offered wage gap for the

[1]Liu (2004) controls for individual productivity characteristics, marital status, occupation and industry characteristics, and even ethnicity while Pham and Reilly (2007) does not control for occupational characteristics.

whole population. The literature has proposed several methods for dealing with this problem: (i) Heckman two-step technique to correct the selection bias (Heckman, 1979) as in the case where the labour market status is binary, and (ii) multinomial selectivity as in the case where labour market status cannot be described by just two alternatives, including Lee (1983), Dubin and McFadden (1984), Dahl (2002). In details, after selection bias correction by Heckman method, the offered wage gap becomes even larger, for example, the male-female offered wage ratio is 1.12 in urban China (Heshmati & Su, 2017), 2 in urban Bangladesh (Ahmed & Maitra, 2010), and 2.57 in urban Indonesia (Taniguchi & Tuwo, 2014). Alternatively, Taniguchi and Tuwo (2014) also employ the Lee method to estimate the gender wage gap in Indonesia and find that the gender wage gap is wider for full employment compared to underemployment and severe underemployment. More recently, Yahmed (2018) considers endogenous selection into formal and informal jobs to estimate the gender wage gaps in these jobs in urban Brazil by using the Lee, and the Dubin and McFadden methods. She finds that the gender wage gap in formal jobs becomes bigger whereas the gender gap in informal jobs seems slightly smaller after the selection bias.

By employing the widely-used method to decompose the gender wage gap at the mean (known as the Oaxaca-Blinder method) in order to analyse to what extent the wage differential depend on differences in characteristics or different treatments by gender, most of the studies show that a small proportion of the gap is explained by the differences in individual characteristics whereas a large proportion of the gap is due to the different treatments towards the gender, for example, around 73 per cent in urban Bangladesh (Ahmed & Maitra, 2010), 87 per cent in urban Indonesia (Taniguchi & Tuwo, 2014) and in urban China (Heshmati & Su, 2017). This portion of the gender wage gap is even bigger in Vietnam (i.e. accounting for more than 100 per cent) (Liu, 2004; Pham & Reilly, 2007; Pierre, 2012; Tran, 2015), which implies that given observed characteristics, if the returns to productivity characteristics of women were the same as those of men, women, on average, would even earn higher than men.

Some other methods of the gender wage gap beyond the mean have been often used in empirical studies: (i) Juhn, Murphy, and Pierce (1993) (denoted JMP) to explain the gender wage differentials in terms of differences in characteristics and in terms of residuals, (ii) quantile regression which originally was suggested by Machado and Mata (2005) to explore the gender wage gap at different quantiles of the wage distribution. For example, using the JMP method to analyse the gender wage differentials in Vietnam from 1992/93 to 1997/1998, Liu (2004) finds that 65 per cent of the contraction of the gender wage gap between 1992/93 and 1997/98

was primarily explained by occupational, sectoral variables, and experience variables whereas the education variable increases the gap because of the lower human capital stock of females in the transition period.[2] The changes in the wage structure between 1992/93 and 1997/98 contributed to the convergence of the gender wage gap in this period. This is also consistent with Pham and Reilly (2007) showing the contraction of the gender wage gap between 1992/1993 and 2002 in spite of no selection bias in their study. Alternatively, by using the quantile regression, Pham and Reilly (2007) and Tran (2015) find that the gender wage gap is smaller at the bottom end of the distribution, and becomes larger at the top of the distribution.[3] For example, the gender wage gap in logarithm form at 90th, 50th, 25th and 10th percentile is around 0.11, 0.15, 0.19 and 0.25, respectively (Pham & Reilly, 2007). This implies that gender wage differentials in higher level occupations (i.e. skilled jobs) is smaller than that in manual or unskilled jobs because of the higher wage of skilled jobs. Both of these studies show the contraction in the gender wage gap over year since 1992/93. More specifically, the contraction in the gender wage gap between 1993 and 2002 is more pronounced at the top of the distribution rather than the bottom end of the distribution, especially at 10th percentile (Pham & Reilly, 2007). In short, there is no Vietnamese studies using the Dubin and McFadden method to revisit the gender wage gap in Vietnam. Therefore, this study first attempts to revisit gender wage gap in Vietnam by considering the role of selection bias in employment allocation in Vietnam.

Most studies of the Vietnamese labour market focus on the gender wage gap (see Liu, 2004; Pham & Reilly, 2007; Pierre, 2012; Tran, 2015) but few have explored the ethnic wage gap (see Hoang & Roubaud, 2016; Pham & Reilly, 2009). Ethnic minorities earned approximately 10-11 per cent less than the Kinh and Chinese majorities in 2002 (Pham & Reilly, 2009) and 22 per cent less than the Kinh majority in 2007 (Hoang & Roubaud, 2016). The ethnic wage gap is more pronounced in the agricultural sector (i.e. 48 percentage points) whereas it is 18 percentage points in non-agricultural employment (Hoang & Roubaud, 2016). By using the decomposition at the mean, Hoang and Roubaud (2016) find that differences in characteristics account for about two third of the ethnic wage gap.

[2]Liu (2004) uses the Hay method to correct the selection bias by specifying a multinomial logit model with three categories including wage sector, self-employment and not-working. However, the selection estimates are not reported.

[3]Tran (2015) uses Heckman technique in the combination with quantile regression to identify the gender wage gap in Vietnam between 2002 and 2012 whereas Pham and Reilly (2007) do not consider the selection bias for either the mean or quantile log wage regression models since they argue that the estimates corresponding to the selection terms are not well identified

5.3 The evolution of employment allocation in Vietnam

Vietnam experienced comprehensive economic reforms by the end of 1980, named 'Doi Moi' officially in the 6th national congress of the communist party. The process of economic transition from a centrally-planned to a market-based economy implies profound labour market changes. By then, there had been some new polices on price, salary and currency. In fact, 'food stamp' and 'family rice booklet' which had been popular forms of wage in the planned economy were replaced by market economy wages. The change from a centrally-determined wage system, which in the past limited the degree of gender wage inequality, created potential for a widening of the gender wage gap (Pham & Reilly, 2007). It was accompanied with the collapse of big state-owned enterprises, a reduction in a variety of public services, and changes in institutional framework, which all negatively affected female than male workers (Pham & Reilly, 2007). This led to the structural change of the economy due to labour reallocation in the labour market. Natural job change was associated with the growth of the private and informal sector which provide less secure jobs with fewer benefits. This resonates with studies of other developing countries that find self-employment to be very common. According to Gindling and Newhouse (2014), in low- and middle-income countries, fewer than half of all workers are wage and salary employees compared to over 85 per cent in high income countries. They also show that an increase in per capita GDP within the low-income country group leads to a shift out of agricultural non-paid employment and own-account work, into non-agricultural own account jobs.

The labour market in developing countries, including Vietnam, is gender segregated. There are significant gender differences in the allocation across wage salaried employment, self-employment and non-employment. Men are more likely to work in the wage salaried sector whereas women are more likely to be self-employed (see Table 5.1).

Table 5.1: **Distribution of employment sector of 22-55 year olds in urban areas, by survey**

	Male	Female	Male-Female gap
VHLSS 2002 (urban)			
Wage/Salary sector	53.0%	35.3%	17.7%
Self-employment	39.8%	49.6%	-9.8%
Not working	7.3%	15.1%	-7.8%
VHLSS 2008 (urban)			
Wage/Salary sector	58.9%	43.6%	15.3%
Self-employment	32.7%	40.4%	-7.7%
Not working	8.5%	16.0%	-7.5%
VHLSS 2014 (urban)			
Wage/Salary sector	58%	46.6%	11.4%
Self-employment	34.8%	40.9%	-6.1%
Not working	7.2%	12.5%	-5.3%

Note: Self-employment sector includes self-employment in agriculture and self-employment in non-agriculture.

Sample sizes: VHLSS 2002: 13,099 observations (6,429 males & 6,670 females)
VHLSS 2008: 4,606 observations (2,186 males & 2,420 females)
VHLSS 2014: 5,070 observations (2,433 males & 2,637 females)

Source: Authors' calculations from VHLSS 2002, 2008, 2014.

Table 5.1 compares the allocation of 22-55 years olds across three employment categories between 2002 and 2014. The majority of men were employed in the wage salaried sector, with 53, 59 and 58 per cent in 2002, 2008 and 2014, respectively. The increase in the proportions employed in the wage salaried sector is also evident for women, whose percentages increased more rapidly from 35.3 to 46.6 per cent between 2002 and 2014. Although for both men and women, the increases in the proportions of the wage earners have come mostly from the self-employed, the proportion of the self-employed has remained sizeable at 34.8 per cent for men and 40.9 per cent for women. With regards to the not working group, its shares for men during this period seemed stable at about 7 per cent whereas its shares for women declined from 15.1 to 12.5 per cent. However, in practice, most self-employment jobs in the Vietnamese labour market are own-account vendors, which reflects insecurity rather than the flexibility (ILO, 2018).

In short, the selection in employment status is largely gender-specific, in which a disproportionate fraction of women workers work outside the wage salaried sector

despite having the same observed characteristics of men.

5.4 Methodology

Initially, we estimate the following Mincerian wage equation which shows the relationship between logarithms of wage and individual characteristics

$$Y = lnW = \alpha + X\beta^{'} + u \tag{5.1}$$

where Y is the natural logarithm of hourly wage of each individual, and X is a vector of explanatory variables augmented of individual characteristics and demographic characteristics, and β is a vector of corresponding coefficients of X and u is an independent and identically distributed idiosyncratic error term.

Equation 5.1 is run separately for males and females, using OLS. However, since earnings are available only for wage-earners, OLS estimation of equation 5.1 would produce biased estimators if, as expected, selection into different employment sectors were correlated with potential determinants of earnings. In fact, there are some studies showing that selectivity correction bias has an impact on wage estimation, for example, Beblo, Beninger, Heinze, and Laisney (2003), and Neuman and Oaxaca (2004). A proper treatment for selection bias, therefore, should be considered carefully. In this study, we consider the selection bias correction in the wage estimation by using two methods, including (i) Heckman two-step (Heckman, 1979) using the binary probit selection equation, and (ii) Dubin and McFadden (1984) method using the multinomial logit specification of the selection.

5.4.1 Correct the selection bias

Selection bias corrections based on the binary probit model

Heckman (1979) is the most widely-used method to correct the selection bias. Thus, we also use the Heckman two step in this study to correct for the sample selection bias.

Let consider the wage equation in wage/salaried employment is given by equation 5.1, and the selection equation of participation in wage/salary employment is given by

$$Y^* = \delta + Z\gamma^{'} + \eta \tag{5.2}$$

where Y^* takes the value of 1 if an individual is a paid wage/salaried earner and have got the earning positive wage and 0 otherwise, η is a distributed error term with a mean of zero and a standard deviation equal to 1. Z denotes observable

features including the overlapping variables with X and at least one extra variable in order to ensure that the model is non-parametrically identified.

The selection equation depends on observed variables Z, and an unobserved error η. A standard assumption, which we will make, is that Z is exogenous in the main equation

$$E(u|X, Z) = 0 \tag{5.3}$$

The error term η in the sample selection equation is assumed to be independent of Z, and therefore X. We also assume that η has a standard normal distribution.The correlation between u and η generally causes a sample selection problem (Greene, 2003; Wooldridge, 2010).

The probability of one person working in wage/salaried employment is expressed as

$$Pr(Y^* > 0) = Pr(\eta > -\delta - Z\gamma^{'}) = \Phi(\delta + Z\gamma^{'}) \tag{5.4}$$

where $\Phi(.)$ is the standard normal cumulative distribution function.

Wages are observed for those people working in wage/salaried employment, so that under the assumption that the error terms are jointly normal, the expected wage of wage earner is determined as follows

$$\begin{aligned} E(Y|Y^* > 0) &= \alpha + \beta^{'}X + E(u|\delta + Z\gamma^{'} + \eta > 0) \\ &= \alpha + \beta^{'}X + E(u|\eta > -\delta - Z\gamma^{'}) \\ &= \alpha + \beta^{'}X + \sigma\rho\lambda \\ &= \alpha + \beta^{'}X + \theta\lambda \end{aligned} \tag{5.5}$$

where $\theta = \sigma\rho$ with σ is the standard deviation of u and ρ is the correlation between unobserved determinants of propensity to work in wage/salaried sector η and unobserved determinants of wage offers u, denotes the covariance between the error term in the selection equation, and the error term in the wage equation, and λ is an inverse-Mill ratio, which is defined as a ratio of the standard normal probability density function and standard normal cumulative distribution function.

The Heckman selection bias correction is used when we have a binary selection. However, when there is a large number of exclusive choices in the selection, the multinomial logit specification becomes attractive in applied work (Bourguignon, Fournier, & Gurgand, 2007), which is discussed in the following part.

Selection bias corrections based on the multinomial logit model

A set of methods available in the literature on selection bias correction, for example, Lee (1983), Dubin and McFadden (1984), and Dahl (2002), when selection is

specified as a multinomial logit model, are presented in Bourguignon et al. (2007). The bias corrections proposed in the literature differ in the restrictions imposed, which can be expressed in terms of the joint distribution of residuals. Although Lee method is a commonly-used method, Bourguignon et al. (2007) claimed that the Dublin and McFadden and Dahl method are more preferable since this model can provide fairly good correction for the outcome equation, even when the IIA hypothesis is violated. Therefore, in this study, we present the method of Dubin and McFadden (1984) - hereafter DMF - to correct the selection bias.

We consider the DMF model, including the basic wage equation 5.1 in wage salaried employment, and a selection equation as follows

$$Y_j^* = \delta_j + \gamma_j^{'} Z + \eta_j, \qquad j = 1, 2, 3 \tag{5.6}$$

where j is a categorical variable that describes the corresponding employment sectors, including wage/salaried sector, self-employment sector and not-working. The problem is to estimate the parameter vector β while taking into account that the disturbance term u may be not be independent of all η_j's . This would introduce some correlation between the explanatory variables and the disturbance term in the outcome equation, which makes the OLS estimate of β inconsistent. The model is assumed to be non-parametrically identified from exclusion of some of the variables in Z from the variables in X. Without loss of generality, the outcome variable Y is observed if and only if this person is working in wage/salaried employment or category 1 is chosen, which happens when the maximum utility obtained from wage salaried employment is higher than any other utilities obtained from other employment sectors, or $Y_1^* > max(Y_j^*)$.

Furthermore, DMF model adopts a different approach based on the following linearity assumption

$$E(u|\eta_1\eta_2\eta_3) = \sigma\frac{\sqrt{6}}{\pi}\sum_{j=1,2,3} r_j(\eta_j - E(\eta_j)) \tag{5.7}$$

where r_j is a correlation coefficient between u and η_j.[4]

With the multinomial logit model, given assumption 5.7, the equation 5.1 can

[4]The conditional variance of η_1: $V(\eta_1|y_1^* > \underset{j\neq 1}{maxy_j^*}) = \frac{\pi^2}{6}$.

The conditional variance of $\eta_j, \quad j \neq 1$: $V(\eta_j|y_1^* > \underset{s\neq 1}{maxy_s^*}) = \frac{\pi^2}{6} - P_j\left(\frac{logP_j}{1-P_j}\right)^2$.

See Dubin and McFadden (1984) for a proof.

thus be estimated by least squares on the basis of

$$Y = \alpha + \beta' X + \sigma \frac{\sqrt{6}}{\Pi} \left[\sum_{j=2,3} r_j \left(\frac{P_j ln P_j}{1 - P_j} \right) - r_1 ln P_j \right] \tag{5.8}$$

$$= \alpha + \beta' X + \left[\underbrace{\sigma \frac{\sqrt{6}}{\Pi} r_2} \left(\frac{P_2 ln P_2}{1 - P_2} \right) + \underbrace{\sigma \frac{\sqrt{6}}{\Pi} r_3} \left(\frac{P_3 ln P_3}{1 - P_3} \right) - \underbrace{\sigma \frac{\sqrt{6}}{\Pi} r_1} ln P_1 \right]$$

$$= \alpha + \beta' X + (\tau_1 m_1 + \tau_2 m_2 + \tau_3 m_3) \tag{5.9}$$

where

$$m_1 = -ln P_1$$

$$m_2 = \frac{P_2 ln P_2}{1 - P_2}$$

$$m_3 = \frac{P_3 ln P_3}{1 - P_3}$$

$$\tau_j = \sigma \frac{\sqrt{6}}{\Pi} r_j, \quad j = 1, 2, 3$$

The selection correct term in the bracket in the equation 5.9 is a function of the probabilities of being in different employment categories.

5.4.2 Oaxaca - Blinder decomposition

This study aims to explore the gender wage gap between male and female, thus decomposing mean differences in log wages is employed. An often used methodology to study labour market outcomes by group is known in the literature as the Blinder-Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973).

Given that there are two groups, M for male and F for female, an outcome variable Y, particularly in this study is the logarithm of wage, the difference of the mean outcome between two groups is illustrated as follows

$$\overline{Y}_M = \hat{\alpha}_M + \hat{\beta}'_M \bar{X}_M \tag{5.10}$$

$$\overline{Y}_F = \hat{\alpha}_F + \hat{\beta}'_F \bar{X}_F \tag{5.11}$$

$$\begin{aligned} \overline{Y}_M - \overline{Y}_F &= (\hat{\alpha}_M + \hat{\beta}'_M \bar{X}_M) - (\hat{\alpha}_F + \hat{\beta}'_F \bar{X}_F) \\ &= (\hat{\alpha}_M - \hat{\alpha}_F) + (\hat{\beta}'_M \bar{X}_M - \hat{\beta}'_F \bar{X}_F) \end{aligned} \tag{5.12}$$

This equation can be rearranged into different parts in order to identify the contribution of group differences to the overall outcome difference. There are several

combinations of decomposition parts.

One prominent decomposition in the discrimination literature is calculated based on the notion of non-discriminatory coefficient vector. Thus, as suggestion of Oaxaca and Ransom (1994), the outcome differential can be written as

$$\overline{Y}_M - \overline{Y}_F = (\bar{X}_M - \bar{X}_F)\beta^{*'} + \bar{X}_M(\hat{\beta}'_M - \beta^{*'}) + \bar{X}_F(\beta^{*'} - \hat{\beta}'_F) + (\hat{\alpha}_M - \hat{\alpha}_F) \quad (5.13)$$

where β^* is the estimated non-discriminatory wage structure.

The first term on the right hand side of the equation 5.13 is an estimate of the productivity differential, which is known as an explained part or an endowment component. The second term is an estimate of male wage advantage while the third term is an estimate of female wage disadvantage. And the last term captures the gender difference in the intercept. The decomposition specified by the equation 5.13 can be identified under some assumption about what the wage structure would be in the absence of discrimination. Thus, seeking some representative of the competitive wage structure in the absence of discrimination is necessary.

In practice, there have some suggestions in the literature. For example, Oaxaca (1973) proposed the direct discrimination against one group only, so that $\beta^* = \hat{\beta}_M$ or $\beta^* = \hat{\beta}_F$. Now, the equation 5.13 is re-written as

$$\overline{Y}_M - \overline{Y}_F = (\bar{X}_M - \bar{X}_F)\hat{\beta}'_M + \bar{X}_F(\hat{\beta}'_M - \hat{\beta}'_F) + (\hat{\alpha}_M - \hat{\alpha}_F) \quad (5.14)$$

$$\overline{Y}_M - \overline{Y}_F = (\bar{X}_M - \bar{X}_F)\hat{\beta}'_F + \bar{X}_M(\hat{\beta}'_M - \hat{\beta}'_F) + (\hat{\alpha}_M - \hat{\alpha}_F) \quad (5.15)$$

Equation 5.14 is the case that male wage structure is taken as a reference wage structure whereas equation 5.15 is estimated when female wage structure is considered a reference wage structure. These composition equations are called two-fold decomposition, with the first part known as an explained part or endowment component, which is explained by the group differences in productivity characteristics, and the second part known as an unexplained part or coefficient component, which is often used as a measure of discrimination due to the effects of group differences in unobserved predictors.

However, there is an agreement that there is no specific reason to assume the coefficients of one or the other group are non-discriminatory. Thus, there are some propositions to estimate β^* such as Reimers (1983), Cotton (1988) and Oaxaca and Ransom (1994). For example, a versatile representation of the estimated non-discriminatory wage structure suggested by Oaxaca and Ransom (1994) is given

$$\beta^{*'} = \Omega\hat{\beta}'_M + (1 - \Omega)\hat{\beta}'_F \quad (5.16)$$

where Ω is a matrix of relative weights.

In this study, I use only the basic concept of two-fold Blinder-Oaxaca decomposition. In particular, the gender wage gap is estimated by the equation 5.14 which take male wage structure as a reference due to the assumption that there is no discrimination against male.

Due to the importance of selection bias, we now can compute the extended gender wage gap as

$$\overline{Y}_M - \overline{Y}_F = (\bar{X}_M - \bar{X}_F)\hat{\beta}'_M + \bar{X}_F(\hat{\beta}'_M - \hat{\beta}'_F) + (\hat{\alpha}_M - \hat{\alpha}_F) + (\hat{\theta}_M\bar{\lambda}_M - \hat{\theta}_F\bar{\lambda}_F) \quad (5.17)$$

$$\begin{aligned}\overline{Y}_M - \overline{Y}_F = (\bar{X}_M - \bar{X}_F)\hat{\beta}'_M + \bar{X}_F(\hat{\beta}'_M - \hat{\beta}'_F) + (\hat{\alpha}_M - \hat{\alpha}_F) \\ + [(\hat{\tau}_{1M}\bar{m}_{1M} + \hat{\tau}_{2M}\bar{m}_{2M} + \hat{\tau}_{3M}\bar{m}_{3M}) - (\hat{\tau}_{1F}\bar{m}_{1F} + \hat{\tau}_{2F}\bar{m}_{2F} + \hat{\tau}_{3F}\bar{m}_{3F})]\end{aligned} \quad (5.18)$$

The equation 5.17 and 5.18 show the observed wage differential which is the sum of the following components: the contribution of endowment differences or the explained portion, the unexplained portion that is attributed to labour market discrimination, and the contribution of differences in the average selectivity bias. The equation 5.17 is the case that male wage structure is taken as a reference wage structure whereas the equation 5.18 is estimated when female wage structure is considered a reference wage structure.

Equations 5.17 and 5.18 can be rearranged as

$$(\overline{Y}_M - \overline{Y}_F) - (\hat{\theta}_M\bar{\lambda}_M - \hat{\theta}_F\bar{\lambda}_F) = (\bar{X}_M - \bar{X}_F)\hat{\beta}'_M + \bar{X}_F(\hat{\beta}'_M - \hat{\beta}'_F) + (\hat{\alpha}_M - \hat{\alpha}_F) \quad (5.19)$$

$$\begin{aligned}(\overline{Y}_M - \overline{Y}_F) - [(\hat{\tau}_{1M}\bar{m}_{1M} + \hat{\tau}_{2M}\bar{m}_{2M} + \hat{\tau}_{3M}\bar{m}_{3M}) - (\hat{\tau}_{1F}\bar{m}_{1F} + \hat{\tau}_{2F}\bar{m}_{2F} + \hat{\tau}_{3F}\bar{m}_{3F})] \\ = (\bar{X}_M - \bar{X}_F)\hat{\beta}'_M + \bar{X}_F(\hat{\beta}'_M - \hat{\beta}'_F) + (\hat{\alpha}_M - \hat{\alpha}_F)\end{aligned} \quad (5.20)$$

Here the left-hand side of the equation 5.19 and 5.20 provide the measure of differences in the offered wage, which is different from the observed wage in the equation 5.14 and 5.15. In short, the equation 5.19 and 5.20 present a decomposition of selectivity adjusted wage difference as opposed to a decomposition of observed wage difference in equation 5.14 and 5.15.

5.5 Data analysis

This study analyses the gender wage gap in wage/salaried employment by using the VHLSS dataset. We focus on those respondents aged 22 to 55 years old in urban areas.[5] The main interest variable in this study is the logarithm of hourly wages. The annual wage of a wage-earner is the sum of annual salary and bonus, allowance, or reimbursement from their main job, and then divided by the number of working hours per year for this job in order to derive the hourly wage.[6]

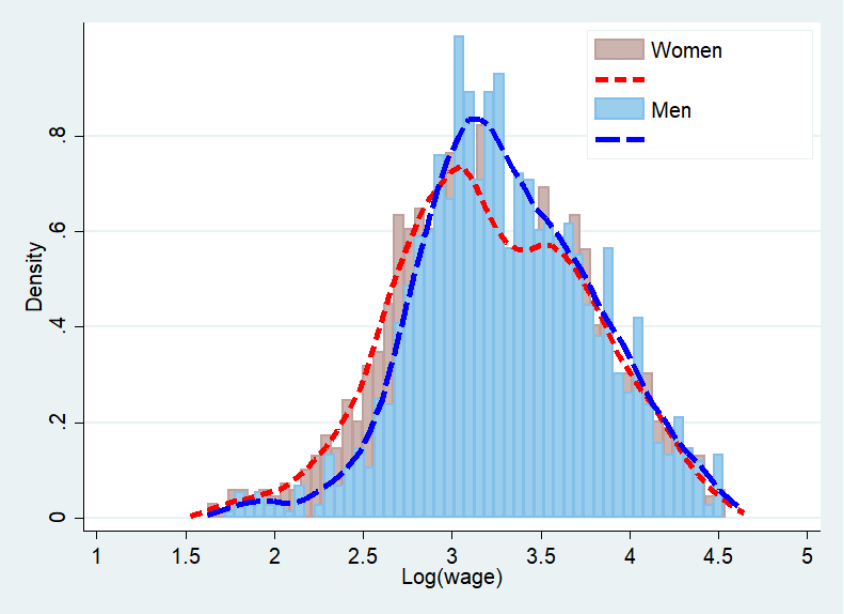

Figure 5-1: **Distribution of logarithm of hourly wage in 2014, by gender**
Source: Authors' calculations using VHLSS 2014

Figure 5-1 shows the distribution of hourly wage between male and female.[7] Kernel density of logarithm of hourly wage of male is, on average, higher and narrower than that of female, which indicates that there is the less variance in male wage than in female wage. In addition, we observe that female hourly wage is moderately higher than male hourly wage at the lower part of the distribution whereas the distribution of male wage at the mean is much higher than that of female. The differential starts narrowing significantly at the upper tail of the distribution; consequently, there is little gap between these distribution at the upper tail.

[5]According to the Vietnamese Labour Code, working age is officially from 15 to 55 years old for women and from 15 to 60 years old for men. Additionally, in urban areas, a large proportion of those people aged from 15 to 22 years old are still at school for education.

[6]The number of working hours per year is calculated by the number of days per year a person has been working times the number of hours that the person has been working this job in a day.

[7]To make the hourly wage more realistic, we focus on the range of hourly wage from 5,000 VND to 100,000VND.

Table 5.2: **Descriptive statistics**

	Male		**Female**		**Difference**
	Mean	**Std.Dev.**	**Mean**	**Std.Dev.**	**Mean$_M$ - Mean$_F$**
	(1)	(2)	(3)	(4)	(5)
Logarithm of hourly wage	3.305	0.491	3.214	0.546	0.090***
Age	38.538	9.292	38.410	9.187	0.127
Age square (/100)	15.715	7.182	15.597	7.103	0.117
Education (Reference: No education)					
Primary	0.167	0.373	0.191	0.394	-0.025*
Lower Secondary	0.203	0.402	0.217	0.412	-0.015
Upper Secondary	0.147	0.355	0.163	0.369	-0.016
Vocational	0.195	0.396	0.111	0.314	0.084***
College or above	0.218	0.413	0.238	0.426	-0.020
Region (Reference: Central Highlands)					
Red River Delta	0.201	0.401	0.213	0.409	-0.012
Midlands & Northern Mountainous areas	0.117	0.321	0.121	0.326	-0.004
Northern & Coastal Central region	0.236	0.425	0.211	0.408	0.025*
Southeastern area	0.205	0.404	0.216	0.412	-0.011
Mekong Delta	0.165	0.371	0.171	0.376	-0.006
Big cities	0.170	0.376	0.181	0.385	-0.011
Non-Kinh ethnicity	0.073	0.261	0.069	0.254	0.004
Health problem	0.046	0.210	0.052	0.222	-0.006
Occupation (Reference: Manual workers)					
Leaders/managers	0.025	0.156	0.011	0.102	0.014***
High- or average-level expert	0.170	0.376	0.206	0.405	-0.037**
Office/Service and sales staff	0.177	0.382	0.308	0.462	-0.131***
Other skilled workers	0.249	0.432	0.111	0.314	0.137***
Types of firms (Reference: State-owned firms)					
Private firms	0.174	0.380	0.128	0.335	0.046***
Foreign invested firms	0.039	0.194	0.059	0.235	-0.020**
Marital status (Reference: Single)					
Married	0.790	0.407	0.800	0.400	-0.010
Separated/Divorced/Widowed	0.028	0.165	0.066	0.249	-0.038***
Observations	2362		2554		

Source: Authors' calculations from VHLSS 2014

Note: Column (5) shows mean difference between male and female.

*, ** and *** denote significance for t-tests of mean equality of two groups at 10%, 5% and 1%, respectively.

The construction of variables are shown in Appendix. Missing education values are dropped.

Table 5.2 presents summary statistics of the variables used in our analysis, by gender. Gender differences in the means of individual characteristics and household characteristics tend to be small, which is shown in the last column of the table 5.2. We do not observe any significant differences between male and female in most

of individual characteristics and household characteristics, except vocational education and marital status. Particularly, we note that there are significantly about an 8-percentage point differential in vocational education in favour for men, and a 4-percentage point differential in marital status (i.e. separated/divored/widowed) in favour for women.

Moreover, there are substantial differences between male and female occupations. For example, more women are in high- or average-level expert and office/service and sale occupation than men whereas more men are leaders or managers, and other skilled workers. We also observe some significant difference between men and women working place. More women are working in foreign invested firms whereas more men are working in private firms.

5.6 Results and discussion

5.6.1 Wage results

This section discusses the estimation results of wage separately for both males and females.

First of all, we present the OLS estimates of male and female wage equations in Table 5.3, in which model 1 controls for individual and household characteristics, model 2 controls for occupation characteristics, model 3 controls for firm characteristics and model 4 controls for marital status, with region fixed effects. We also check the results of these regressions with province fixed effects (shown in Appendix), which are quite similar to the previous models.

In all models, we find that age and its quadratic term are statistically significant in wage equations for both two groups. The wage functions are concave with the turning point around 46-47 years old for both males and females in all models.

Table 5.3: **OLS Wage results, year 2014**

	Model 1		**Model 2**		**Model 3**		**Model 4**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	0.068***	0.065***	0.066***	0.062***	0.066***	0.064***	0.049***	0.048***
	(0.012)	(0.014)	(0.012)	(0.014)	(0.012)	(0.014)	(0.012)	(0.014)
Age square (/100)	-0.074***	-0.069***	-0.071***	-0.067***	-0.072***	-0.068***	-0.052***	-0.048**
	(0.016)	(0.019)	(0.015)	(0.019)	(0.015)	(0.018)	(0.016)	(0.019)
Education (Ref: No education)								
Primary	0.070	0.164**	0.076*	0.157**	0.075*	0.131**	0.075*	0.146**
	(0.046)	(0.069)	(0.045)	(0.068)	(0.045)	(0.066)	(0.044)	(0.066)
Lower Secondary	0.163***	0.227***	0.174***	0.219***	0.176***	0.202***	0.168***	0.213***
	(0.046)	(0.067)	(0.046)	(0.066)	(0.046)	(0.064)	(0.045)	(0.064)
Upper Secondary	0.291***	0.415***	0.314***	0.368***	0.311***	0.344***	0.302***	0.358***
	(0.052)	(0.070)	(0.053)	(0.068)	(0.053)	(0.066)	(0.052)	(0.066)
Vocational	0.417***	0.543***	0.381***	0.400***	0.382***	0.387***	0.374***	0.397***
	(0.045)	(0.068)	(0.046)	(0.069)	(0.045)	(0.068)	(0.045)	(0.068)
College or above	0.708***	0.857***	0.570***	0.563***	0.565***	0.542***	0.556***	0.559***
	(0.045)	(0.062)	(0.057)	(0.072)	(0.057)	(0.070)	(0.056)	(0.071)
Big cities	0.114***	0.156***	0.111***	0.136***	0.125***	0.159***	0.128***	0.162***
	(0.032)	(0.036)	(0.031)	(0.036)	(0.032)	(0.036)	(0.032)	(0.036)
Non-Kinh groups	-0.074	0.074	-0.068	0.058	-0.068	0.054	-0.068	0.061
	(0.050)	(0.055)	(0.048)	(0.051)	(0.049)	(0.051)	(0.048)	(0.052)
Health problem	-0.090	0.099	-0.109	0.100	-0.104	0.059	-0.097	0.047
	(0.072)	(0.062)	(0.071)	(0.063)	(0.072)	(0.065)	(0.072)	(0.063)
Occupation (Ref: Manual workers)								
Leaders/Managers			0.219***	0.498***	0.224***	0.541***	0.221***	0.535***
			(0.080)	(0.107)	(0.080)	(0.107)	(0.080)	(0.104)
High- or average-level experts			0.160***	0.318***	0.161***	0.358***	0.159***	0.356***
			(0.042)	(0.050)	(0.042)	(0.051)	(0.042)	(0.051)
Office/Service and sale staff			-0.139***	0.035	-0.134***	0.070*	-0.136***	0.067
			(0.039)	(0.042)	(0.039)	(0.042)	(0.038)	(0.042)
Other skilled workers			-0.020	-0.039	-0.022	-0.026	-0.022	-0.029
			(0.028)	(0.045)	(0.028)	(0.045)	(0.028)	(0.044)
Types of firm (Ref: Stated-owned firm)								
Private firm					-0.023	0.028	-0.023	0.039
					(0.025)	(0.031)	(0.024)	(0.031)
Foreign invested firm					0.067	0.242***	0.059	0.246***
					(0.045)	(0.040)	(0.044)	(0.041)
Marital Status								
Married							0.131***	0.156***
							(0.033)	(0.038)
Divorced/Separated							-0.020	0.098*
							(0.061)	(0.057)
Regions fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,357	1,189	1,357	1,189	1,373	1,189	1,357	1,189
R-squared	0.368	0.369	0.396	0.406	0.403	0.423	0.406	0.432

Note: In all regressions, constant term and region dummies are included but not reported. Robust standard errors are in parenthesis.
*, **, and *** denote significance at 10%, 5%, and 1%, respectively

Source: Authors' calculations from VHLSS 2014

In addition, education also plays an important role in earnings. The higher the level of educational attainment thatboth males and females obtain, the higher their wage becomes, which is consistent with Liu (2004); Pham and Reilly (2007).

Table 5.4 presents rates of education return for both groups across the models.[8] The returns on education at higher levels (i.e. upper secondary level and college or above level) seem stronger for both groups. In particular, a person with college or above education earns around more than 20 per cent more than a comparable person completing upper secondary but not college education.

Table 5.4: **Returns of education - OLS estimates**

	Model 1		**Model 2**		**Model 3**		**Model 4**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Primary (vs. less than primary)	7.22	17.88	7.93	17.04	7.83	13.97	7.82	15.74
Lower Secondary (vs. primary)	9.76	6.43	10.23	6.36	10.56	7.39	9.73	6.96
Upper Secondary (vs. lower secondary)	13.63	20.75	15.08	16.06	14.53	15.20	14.36	15.55
College or above (vs. upper secondary)	51.76	55.56	29.13	21.59	28.81	21.96	28.94	22.27

Note: Unit %

Source: Authors' calculations from VHLSS 2014.

Moreover, the earnings of both groups living in either Ha Noi or Ho Chi Minh City are significantly higher compared to other cities since they are two biggest cities with high living standards in Vietnam. However, there is no evidence that ethnic minority group (i.e. non-Kinh group) has lower earnings, which is in contrast to Pham and Reilly (2009). Furthermore, it is also insignificant that both males and females with health problems have lower earnings.

Regarding occupation characteristics, both men and women in managerial positions and high- or average-level expert positions, on average, have higher earnings compared to those in lower positions. For example, earnings of men in managerial positions and high- or average-level expert positions, on average, are 25 percentage points, and 17 percentage points higher than those of men in manual jobs, respectively, whilst earnings of women in managerial positions and high- or average-level expert positions, on average, are 65 percentage points , and 38 percentage points higher than those of women in manual jobs in model 2. Additionally, we find the significant negative coefficient of administrative jobs in men wage equation, notwithstanding the marginal positive coefficient of administrative jobs in women wage equation (see Table 5.3). This could be explained by the fact that these positions are likely to be dominated by females.

Turning to firm characteristics, women earnings in foreign invested firms are 28 percentage points higher than in state owned firms. We also find the positive coefficient of foreign invested firms in men equation in spite of its statistical

[8]The return of education is calculated by taking the exponential value of the difference of the coefficients and then minus 1.

insignificance.

Marital status is also a basic determinant of earnings for both males and females. In particular, married men and married women earn significantly around 14 and 17 percentage points more than single comparable counterparts. This seems a stimulus for couples to seek promotion or higher paid jobs in order to maintain and enhance their living standards. This is also explained by the fact that married men and women workers tend to be older than singles, thus they possibly get higher earnings with longer working experience. In addition, divorced/separated/widowed women earn 10 percentage points higher than single women.

More importantly, non-random selection into wage salaried employment may explain the gender wage gap because unobserved factors are correlated with observed factors in wage estimation which may cause the OLS estimation bias. In particular, in the context of Vietnamese employment allocation, workers might not have been randomly assigned to following sectors, including wage and salaried sector, self-employed sector and not working. Sample selection bias, therefore, would be a potential problem for estimating the offered wage gap for the whole population. In this study, we present the earnings estimations for both groups with the selection bias correction in Table 5.5, in which, column (1)-(2) give the estimates with Heckman selection bias correction and column (3)-(4) give the estimates with the selection bias correction based on multinomial logit model following DMF model.

Table 5.5: **Wage results after selection bias**

	Heckman		**DMF**	
	Male	**Female**	**Male**	**Female**
	(1)	(2)	(3)	(4)
Age	0.037*	0.063***	0.013	0.125***
	(0.020)	(0.018)	(0.027)	(0.025)
Age square (/100)	-0.028	-0.066***	-0.002	-0.153***
	(0.028)	(0.025)	(0.034)	(0.034)
Education (Ref: No education)				
Primary	0.086	0.162**	0.067	0.244***
	(0.063)	(0.075)	(0.063)	(0.075)
Lower Secondary	0.194**	0.222***	0.168**	0.318***
	(0.064)	(0.078)	(0.070)	(0.079)
Upper Secondary	0.309***	0.405***	0.339***	0.504***
	(0.066)	(0.091)	(0.065)	(0.097)
Vocational	0.233**	0.515***	0.271*	0.932***
	(0.104)	(0.172)	(0.150)	(0.191)
College or above	0.399***	0.820***	0.569**	1.520***
	(0.154)	(0.213)	(0.296)	(0.261)
Big cities	0.104**	0.156***	0.136***	0.073
	(0.042)	(0.037)	(0.043)	(0.065)
Non-Kinh group	-0.044	0.071	-0.071	0.114
	(0.059)	(0.056)	(0.064)	(0.075)
Health problem	-0.035	0.102*	0.043	0.058
	(0.072)	(0.059)	(0.095)	(0.071)
lambda	-0.543**	-0.037		
	(0.248)	(0.200)		
m1			-0.471***	-0.193**
			(0.140)	(0.098)
m2			-0.381	-1.171**
			(0.725)	(0.425)
m3			0.252	-1.528***
			(0.394)	(0.283)
Region fix effects	Yes	Yes	Yes	Yes
Observations	2,361	2,550	2,361	2,550

Note: In all regressions, constant and region dummies are included but not reported.
Standard errors are in parenthesis.
*, **, and *** denote significance at 10%, 5%, and 1%, respectively.
The base-line model (model 1) is estimated by Heckman and DMF.
Selection equations are reported in Appendix

Source: Authors' calculations from VHLSS 2014.

In both the Heckman and DMF models, we also find the inverse-U shape effect

of age on wage for females whereas we cannot find the inverse-U shape effect of age on wage for males[9]. Furthermore, education is a key factor to improve earnings for both groups. The return to education is stronger at higher levels of education. This pattern is robust to the introduction of the selection control function (see Table 5.6). It is worth noticing a huge return to education at college or above level for female compared to that for male when selection bias is corrected by Heckman and DMF method in relative to OLS estimation.

Table 5.6: **Returns of education after selection bias correction**

	Heckman		**DMF**	
	Male	**Female**	**Male**	**Female**
Lower Secondary (vs. primary)	11.40	6.18	10.63	7.68
Upper Secondary (vs. lower secondary)	12.19	20.08	18.65	20.44
College or above (vs. upper secondary)	9.42	51.44	25.86	176.21

Note: Unit %

Source: Authors' calculations from VHLSS 2014.

Regarding the selection correction term, the inverse Mill's ratio (lambda) in Heckman is significant for males but not significant for females, which indicates that the self-selection bias in wage/salaried employment is only an issue for males. This is in contrast to the study of Liu (2004) which finds the significance of lambda in both models for males and females. The negative sign of lambda means the negative correlation of the error terms in the wage equation and selection equation. This is statistically significant in the male model, which implies that men who are less productive are selected in wage/salaried employment.[10]

Turning to DMF approach, we find the negative coefficients in selection term in wage/salaried employment (i.e. m_1) for both groups. In particular, the male value is statistically significant at 1 per cent confidence level while the female value is marginally significant at 10 per cent confidence level. This is consistent with the Heckman results as discussed above. In addition, there is statistical significance of negative coefficients in selection terms in self-employment (i.e. m_2) and not-working (i.e. m_3) for females, but not for males. The absolute value of selection term in not-working is slightly larger than the absolute value of the selection term in self-employment and much greater than the absolute value of the selection term

[9]The wage function is concave with the turning point around 48 years old and 41 years old in Heckman and DMF model, respectively.

[10]See Ermisch and Wright (1994)

in wage salaried employment in female models. This implies that it is more likely that women who are less productive are selected to stay outside wage salaried employment.

In addition, we also apply the same method to estimate the wage equations for males and females in 2002. The OLS wage estimates for 2002, which are shown in Table 5.7, are similar to the results for 2014.

Table 5.7: **OLS Wage results, year 2002**

	Model 1		**Model 2**		**Model 3**		**Model 4**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	0.060***	0.045***	0.060***	0.047***	0.065***	0.054***	0.046***	0.039***
	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.012)
Age square (/100)	-0.066***	-0.048***	-0.065***	-0.051***	-0.071***	-0.059***	-0.050***	-0.042**
	(0.014)	(0.016)	(0.014)	(0.016)	(0.014)	(0.016)	(0.015)	(0.016)
Education (Ref: No education)								
Primary	0.027	-0.065*	0.024	-0.051***	-0.071***	-0.059***	-0.050***	-0.042***
	(0.030)	(0.039)	(0.030)	(0.038)	(0.029)	(0.037)	(0.029)	(0.037)
Lower Secondary	0.167*	0.398***	0.171*	0.364***	0.168	0.331***	0.172*	0.315***
	(0.090)	(0.107)	(0.092)	(0.108)	(0.103)	(0.106)	(0.101)	(0.105)
Upper Secondary	0.194***	0.296***	0.204***	0.242***	0.187***	0.224***	0.187***	0.219***
	(0.031)	(0.037)	(0.032)	(0.038)	(0.031)	(0.038)	(0.031)	(0.037)
Vocational	0.418***	0.456***	0.420***	0.296***	0.383***	0.273***	0.384***	0.269***
	(0.029)	(0.035)	(0.031)	(0.044)	(0.030)	(0.043)	(0.030)	(0.043)
College or above	0.674***	0.779***	0.677***	0.555***	0.647***	0.540***	0.651***	0.544***
	(0.028)	(0.033)	(0.037)	(0.048)	(0.037)	(0.047)	(0.037)	(0.047)
Big cities	0.407***	0.408***	0.410***	0.416***	0.390***	0.397***	0.397***	0.404***
	(0.029)	(0.033)	(0.029)	(0.033)	(0.029)	(0.033)	(0.029)	(0.033)
Non-Kinh groups	-0.054	0.022	-0.050	0.001	-0.012	0.004	-0.004	0.015
	(0.047)	(0.046)	(0.047)	(0.045)	(0.044)	(0.043)	(0.044)	(0.043)
Occupation (Ref: Manual workers)								
Leaders/Managers			-0.038	0.203**	-0.070	0.173**	-0.074	0.169**
			(0.057)	(0.084)	(0.058)	(0.084)	(0.058)	(0.084)
High- or average-level experts			0.009	0.301***	-0.012	0.269***	-0.015	0.266***
			(0.033)	(0.045)	(0.033)	(0.045)	(0.033)	(0.045)
Office/Service and sale staff			-0.059*	0.172***	-0.091**	0.144***	-0.089**	0.147***
			(0.036)	(0.041)	(0.036)	(0.041)	(0.036)	(0.041)
Other skilled workers			0.019	0.081**	-0.003	0.046	-0.005	0.049
			(0.023)	(0.033)	(0.023)	(0.032)	(0.023)	(0.033)
Types of firm (Ref: Stated-owned firm)								
Private firm					-0.651***	-0.501***	-0.659***	-0.510***
					(0.066)	(0.087)	(0.066)	(0.088)
Foreign invested firm					0.004	-	-0.005	-
					(0.035)		(0.035)	
Marital Status								
Married							0.113***	0.118***
							(0.027)	(0.029)
Divorced/Separated							0.105	0.086*
							(0.088)	(0.049)
Regions fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,362	2,314	3,362	2,314	3,362	2,314	3,362	2,314
R-squared	0.319	0.338	0.320	0.353	0.350	0.369	0.354	0.373

Note: In all regressions, constant term and region dummies are included but not reported.
Robust standard errors are in parenthesis.
*, **, and *** denote significance at 10%, 5%, and 1%, respectively
In wave 2002 sample, there are no women working in foreign invested firms.
Source: Authors' calculations from VHLSS 2002

Table 5.8: **Wage results after selection bias, year 2002**

	Heckman		**DMF**	
	Male	**Female**	**Male**	**Female**
	(1)	(2)	(3)	(4)
Age	0.052***	0.046***	0.049**	0.084***
	(0.013)	(0.012)	(0.024)	(0.030)
Age square (/100)	-0.051***	-0.049***	-0.030	-0.100**
	(0.019)	(0.016)	(0.031)	(0.040)
Education (Ref: No education)				
Primary	0.033	-0.069*	0.060	-0.052***
	(0.031)	(0.040)	(0.042)	(0.045)
Lower Secondary	0.171	0.414***	0.172	0.452***
	(0.129)	(0.142)	(0.151)	(0.144)
Upper Secondary	0.183***	0.306***	0.115*	0.288***
	(0.069)	(0.090)	(0.059)	(0.050)
Vocational	0.316***	0.499***	-0.088	0.583***
	(0.089)	(0.127)	(0.166)	(0.146)
College or above	0.527***	0.833***	-0.138	0.970***
	(0.125)	(0.160)	(0.277)	(0.202)
Big cities	0.366***	0.417***	0.171**	0.379
	(0.045)	(0.042)	(0.086)	(0.067)
Non-Kinh group	-0.039	0.019	0.013	0.027
	(0.047)	(0.070)	(0.072)	(0.053)
lambda	-0.261	0.061		
	(0.216)	(0.175)		
m1			-0.236**	-0.132
			(0.096)	(0.087)
m2			1.772**	-0.469
			(0.711)	(0.387)
m3			0.685**	-0.934***
			(0.287)	(0.352)
Region fix effects	Yes	Yes	Yes	Yes
Observations	6,383	6,625	6,383	6,625

Note: Standard errors are in parenthesis.
*, **, and *** denote significance at 10%, 5%, and 1%, respectively.
In all regressions, region dummies are included but not reported.
The base-line model (model 1) is estimated by Heckman and DMF.
Selection equations are not reported.
The results with province fixed effects are similar and not reported.
Source: Authors' calculations from VHLSS 2014.

Table 5.8 presents the wage estimates for the wave 2002 after selection bias correction. The results show that the inverve Mill's ratio (lambda) is insignificant in wage estimates for both males and females for wave 2002, which is different to the results for wave 2014. This contradicts with Tran (2015), which shows a

statistically significant inverse Mill's ratio at different quantiles of the wage distribution. Alternatively, we use the Dubin and McFadden (1984) method to correct the selection bias, and the results show the negative coefficients in selection term in wage/salaried employment (i.e. m_1) for both groups, but not statistically significant for females. Regarding other selection terms in self-employment (i.e. m_2) and not working (i.e. m_1), the results depict the statically significant coefficient of these terms for males, but for females, for instance, the selection term in not working for females is, on average, significantly associated with their lower wage.

5.6.2 Oaxaca - Blinder decomposition

The next step is to analyse the mean logarithm of wage between males and females and access to some extent how the gender wage differential can be explained, i.e. the gender wage gap depends on differences in characteristics or difference in treatment by gender, which is illustrated in Table 5.9, and Table 5.10.

Table 5.9: **Oaxaca - Blinder decomposition results, year 2014**

	OLS	**Heckman**	**DMF**
The mean of logarithm of male wage	3.312	3.633	3.407
The mean of logarithm of female wage	3.224	3.248	2.450
Difference in offered wage	**0.088**	**0.385**	**0.958**
+ Difference in observed wage	0.088	0.088	0.088
+ Difference in selection bias	-	0.297	0.870
Two fold decomposition			
+ Explained part	-0.039***	-0.012	-0.067*
+ Unexplained part	0.127***	0.398**	0.994***
Overall wage gap	**0.088**	**0.385**	**0.958**

Note: *, **, and *** denote significance at 10%, 5%, and 1%, respectively.
The decomposition is done for the base-line model (model 1).
Source: Authors' calculations from VHLSS 2014.

Table 5.10: **Oaxaca - Blinder decomposition results, year 2002**

	OLS	**Heckman**	**DMF**
The mean of logarithm of male wage	1.583	1.761	1.572
The mean of logarithm of female wage	1.411	1.357	0.314
Difference in offered wage	**0.172**	**0.403**	**1.258**
+ Difference in observed wage	0.172	0.172	0.172
+ Difference in selection bias	-	0.231	1.086
Two fold decomposition			
+ Explained part	-0.029***	-0.020*	-0.028*
+ Unexplained part	0.201***	0.423**	1.286***
Overall wage gap	**0.172**	**0.403**	**1.258**

Note: *, **, and *** denote significance at 10%, 5%, and 1%, respectively.
The decomposition is done for the base-line model (model 1).
Source: Authors' calculations from VHLSS 2002.

In general, the mean differential decomposition of Oaxaca - Blinder shows us that in 2014 the mean of logarithm of wage is 3.312 for men, equivalent to 27,440VND, and 3.224 for women, equivalent to 25,128VND, which yields a wage gap of 0.088 in log form with no correction for selection bias. In other words, the female-to-male earning ratio is approximately 0.92 in 2014. Back in year 2002, the female-to-male earnings ratio is approximately 0.84, which is similar to the results of Pham and Reilly (2007). By comparing the results of empirical studies on Vietnam gender wage gap, for example, 0.76 in 1993 (Liu, 2004; Pham & Reilly, 2007), 0.88 in 1998, and 2002 (Pham & Reilly, 2007), and 0.85 in 2011, and 0.87 in 2014 (Demombynes & Testaverde, 2018), we claim that there has been a decrease in the gender wage gap since 1990s, which is inconsistent with recent wage reports of ILO (2013, 2015), which show that there has recently been a slight increase of 2 percentage points in the gender wage gap.

However, after selection bias correction, the gender offered wage gap becomes substantially bigger, up to 0.403 and 1.258 in log form in Heckman and DMF method, respectively, in 2002. The gender offered wage gap has narrowed in 2014, staying at 0.385 and 0.958 in log form in Heckman and DMF method, respectively, indicating that female offered wage is, on average, around 68 per cent and 38 per cent of male offered wage in corresponding method. In particular, the gender wage gap after Heckman selection bias correction in this study seems bigger in

comparison with the study of Tran (2015). The selectivity term in Heckman is negative for men, which indicates that less productive males are selected into wage/salaried employment. The offered wage for males is, thus, estimated to be higher than observed wage. Similarly, DMF approach also gives us the higher offered wage for males and lower offered wage for females, which means that less productive males are selected in wage/salaried employment whereas less productive females are selected in non-wage employment.

Table 5.9 also shows the contribution of different parts of decomposition of gender wage gap between males and females. We find that the gender wage gap is mainly explained by the unexplained part, which may indicate the gender discrimination. This result is consistent with most of the studies on gender wage gap in Vietnam, such as Liu (2004), Pham and Reilly (2007) and Pierre (2012). The negative explained part in all models implies that if the returns to characteristics of women were the same as men's, women would, on average, earn more than men.

Particularly, the results of the detailed Oaxaca - Blinder decomposition (see Table 5.11, and Table 5.12) show that education plays an important role in the endowment part while the impact of these other characteristics such as region, big city, ethnicity, seem minimal compared to that of education. This is in line with the finding of Nakavachara (2010) in Thailand which does not address the selection bias correction. The negative contribution of education to the overall gender wage gap means that the overall difference in gender wage gap would even be larger if average schooling of men and women would be the same, since women have, on average, slightly more schooling than men in the sample. Occupation is another factor in the endowment part (see Table 5.11), which takes account of the second large proportion of the negative endowment part in the gender wage gap. However, the negative endowment part in the gender wage gap is partly offset by the positive effect of age.

Table 5.11: **Detailed Oaxaca - Blinder decomposition of OLS estimates**

	Model 1		**Model 2**		**Model 3**	
The explained part	**-0.039**		**-0.040**		**-0.044**	
+ Age	0.017***	(0.005)	0.017***	(0.005)	0.017***	(0.005)
+ Education	-0.048***	(0.011)	-0.035***	(0.009)	-0.036***	(0.008)
+ Region	-0.006*	(0.003)	-0.006**	(0.003)	-0.006**	(0.003)
+ Big city	-0.003	(0.002)	-0.003	(0.002)	-0.004*	(0.002)
+ Ethnicity	0.0005	(0.0008)	0.0004	(0.0007)	0.0004	(0.0007)
+ Health	0.001	(0.001)	0.001	(0.001)	(0.001)	(0.001)
+ Occupation			-0.014*	(0.007)	-0.014*	(0.007)
+ Firm					-0.004*	(0.003)
The unexplained part	**0.127**		**0.128**		**0.133**	
+ Age	0.051	(0.316)	0.090	(0.309)	0.028	(0.308)
+ Education	-0.120	(0.078)	-0.022	(0.081)	-0.005	(0.080)
+ Region	-0.025	(0.074)	-0.023	(0.072)	0.002	(0.072)
+ Big city	-0.010	(0.012)	-0.006	(0.011)	-0.008	(0.012)
+ Ethnicity	-0.010**	(0.005)	-0.009*	(0.005)	-0.008*	(0.005)
+ Health	-0.009**	(0.004)	-0.010**	(0.004)	-0.008*	(0.004)
+ Occupation			-0.105***	(0.037)	-0.130***	(0.037)
+ Firm					-0.036**	(0.014)
+ Constant	0.250	(0.338)	0.212	(0.331)	0.297	(0.330)

Note: Standard error are reported in the bracket.

*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Source: Authors' calculations from VHLSS 2014.

Table 5.12: **Detailed Oaxaca - Blinder decomposition of Heckman and DMF estimates**

	Heckman		**DMF**	
The explained part	**-0.012**		**-0.037**	
+ Age	0.022***	(0.006)	0.016***	(0.006)
+ Education	-0.026**	(0.012)	-0.044***	(0.016)
+ Region	-0.005	(0.003)	-0.005*	(0.003)
+ Big city	-0.003	(0.002)	-0.004	(0.002)
+ Ethnicity	0.0003	(0.0006)	0.0005	(0.0008)
+ Health	0.0004	(0.0008)	-0.0005	(0.0009)
The unexplained part	**0.398**		**0.994**	
+ Age	-0.425	(0.455)	-1.950***	(0.538)
+ Education	-0.252	(0.166)	-0.578***	(0.183)
+ Region	-0.129	(0.107)	-0.205**	(0.105)
+ Big city	-0.012	(0.013)	0.015	(0.014)
+ Ethnicity	-0.008	(0.006)	-0.013**	(0.005)
+ Health	-0.007	(0.005)	-0.001	(0.004)
+ Constant	1.231	(0.782)	3.727***	(0.860)

Note: Standard error are reported in the bracket.

*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

Source: Authors' calculations from VHLSS 2014.

The impact of the explanatory variables on the unexplained part appears to be of more interest because the unexplained portion may disentangle the sources of discrimination. The gender wage gap in Vietnam is due to the unexplained part, which is consistent with previous studies such as Liu (2004), Pham and Reilly (2007), and Tran (2015). This is also true for some developing countries such as Thailand (Nakavachara, 2010) and Indonesia (Taniguchi & Tuwo, 2014). In particular, there are negative contributions of education, occupation, and firm characteristics to the unexplained part. However, these effects are cancelled out by a positive effect of the intercept term (i.e. unobservable characteristics). However, Oaxaca and Ransom (1994) and Yun (2005) argue that the value of the intercept may change due to the different choices of base category. Though Oaxaca and Ransom (1999) and Yun (2005) proposed an intuitively appealing solution to the problem by using normalized regression equation where the estimate is simply the average of different sets of estimates with varying reference group, this study does

not address this suggestion.

5.7 Conclusion

This study uses the VHLSS to estimate and analyse the gender difference in wage in urban Vietnam. We find that women, on average, earn around 8 percentage points less than men. However, in the context of Vietnam and other developing countries where workers might not have been randomly assigned to sectoral employment allocation, the sample selection bias is a potential issue. A merit of this study is the consideration of self-selection into the wage-salaried sector in order to explore the gender wage gap by using the DMF method based on the multinomial logit model. We find that women, on average, earn around 8 percentage points less than men. However, after the selection bias correction, the gender wage gap becomes even bigger, with women earnings around 40 percentage points less than men's since less productive men are selected in wage/salaried employment while less productive women are selected in non-wage/salaried employment. In short, the role of the gender difference in employment allocation is important in the wage estimation. Therefore, some encouragements for women working in wage salaried are recommended.

Our results suggest that education plays an important role in wage determination. Males and females, on average, earn more when they have higher levels of education. However, the returns for education for females appear higher than that for males, especially at college level or above. In addition, occupation and firm characteristics are also determinants of earnings estimation. Both men and women in managerial positions and high- or average-level expert positions, on average, have higher earnings compared to those in lower positions.

Subsequently, the mean decomposition followed by the Oaxaca - Blinder approach shows that males, on average, get higher paid than females. This study also finds that the gender wage gap is mostly due to the unexplained part, or differences in coefficients, which is pronounced in Vietnam, and in some developing countries such as Thailand and Indonesia.

Among all characteristics, education plays an important role to the extent of the gender wage gap in terms of both endowment part and coefficient part. Two recommendations follow: (1) From the perspective of employees, they should be strategic in investing in education in order to make their work productive. (2) From the perspective of employers, they should encourage their employees to improve their education by providing specific training programs to corresponding groups of employees, thus raising the productivity in order to enhance the competitiveness

of the enterprise during the globalisation. They should ensure equal treatment of male and female workers, for example, equal recruitment, equal training, and equal rewards to both genders to avoid prejudices against female workers as a traditionally social norm in Vietnam, regardless of types of firms.

5.A Appendix

5.A.1 Descriptive statistics

The commonly-used instrument variables in literature are the number of children under 6, the number of the elderly, or the combination of both these variables known as the dependent ratio (Comola & De Mello, 2013; Hoang & Roubaud, 2016; Liu, 2004), or even the non-labour income (Liu, 2004; Schafgans, 2000; Tansel, 2005). Therefore, in this study, the variables that were excluded from wage equation but included in selection equation in wage employment with dependent variable whether the individual are in wage/salary employment are: (i) Number of children under 6 years old, (ii) Presence of elderly aged over 60, and (iii) Interaction term between these former variables.

Table 5.13: **Descriptive statistics of instrumental variables for identification**

	Male		**Female**		**Difference**
	Mean	**Std.Dev.**	**Mean**	**Std.Dev.**	**Mean$_{M}$ - Mean$_{F}$**
	(1)	(2)	(3)	(4)	(5)
Born before 1968	0.254	(0.435)	0.242	(0.428)	0.012
Children under 6 years old	0.416	(0.624)	0.402	(0.607)	0.014
Elderly aged 60+ years old	0.255	(0.436)	0.253	(0.435)	0.004
Children under 6 x Elderly aged 60+	0.127	(0.407)	0.130	(0.403)	-0.003
Observations	2362		2554		

Source: Authors' calculations from VHLSS 2014

Note: Column (5) shows mean difference between male and female.

*, ** and *** denote significance for t-tests of mean equality of two groups at 10%, 5% and 1%, respectively.

5.A.2 The distribution of hourly wage, year 2002

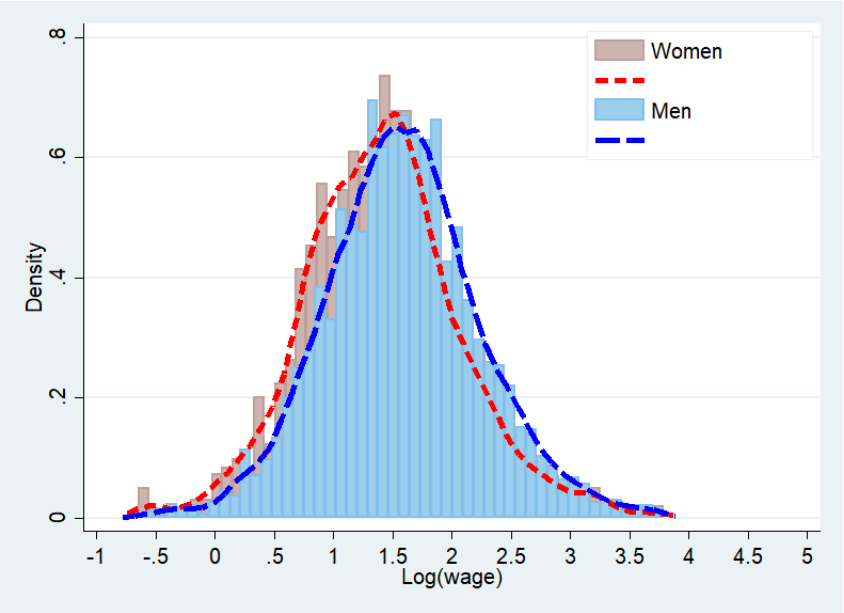

Figure 5-2: **Distribution of logarithm of hourly wage in 2014, by gender**
Source: Authors' calculations using VHLSS 2014

5.A.3 The wage estimates with province fixed effects

OLS wage estimates with province fixed effects

Table 5.14: **OLS Wage results with province fixed effects**

	Model 1		**Model 2**		**Model 3**		**Model 4**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	0.063***	0.066***	0.061***	0.063***	0.061***	0.065***	0.043***	0.048***
	(0.012)	(0.015)	(0.012)	(0.015)	(0.012)	(0.014)	(0.012)	(0.015)
Age square (/100)	-0.067***	-0.070***	-0.064***	-0.068***	-0.064***	-0.069***	-0.044***	-0.048**
	(0.016)	(0.020)	(0.015)	(0.019)	(0.015)	(0.019)	(0.016)	(0.020)
Education (Ref: No education)								
Primary	0.093**	0.142**	0.097**	0.131*	0.094**	0.118*	0.092**	0.135**
	(0.046)	(0.071)	(0.045)	(0.070)	(0.045)	(0.068)	(0.044)	(0.068)
Lower Secondary	0.186***	0.252***	0.196***	0.243***	0.197***	0.231***	0.188***	0.243***
	(0.047)	(0.068)	(0.046)	(0.066)	(0.046)	(0.065)	(0.045)	(0.065)
Upper Secondary	0.316***	0.403***	0.344***	0.345***	0.341***	0.322***	0.331***	0.338***
	(0.054)	(0.070)	(0.054)	(0.068)	(0.054)	(0.066)	(0.053)	(0.066)
Vocational	0.436***	0.543***	0.403***	0.379***	0.403***	0.369***	0.394***	0.381***
	(0.046)	(0.068)	(0.047)	(0.070)	(0.047)	(0.069)	(0.046)	(0.069)
College or above	0.730***	0.850***	0.601***	0.525***	0.595***	0.510***	0.586***	0.527***
	(0.046)	(0.063)	(0.059)	(0.075)	(0.059)	(0.074)	(0.058)	(0.075)
Non-Kinh groups	-0.031	0.071	-0.024	0.042	-0.027	0.025	-0.024	0.029
	(0.055)	(0.066)	(0.054)	(0.062)	(0.054)	(0.060)	(0.053)	(0.061)
Health problem	-0.078	0.106	-0.099	0.111*	-0.094	0.077	-0.084	0.066
	(0.069)	(0.065)	(0.068)	(0.065)	(0.069)	(0.066)	(0.069)	(0.065)
Occupation (Ref: Manual workers)								
Leaders/Managers			0.181**	0.522***	0.186**	0.559***	0.184**	0.555***
			(0.084)	(0.114)	(0.084)	(0.112)	(0.084)	(0.108)
High- or average-level experts			0.156***	0.353***	0.156***	0.389***	0.155***	0.390***
			(0.043)	(0.054)	(0.043)	(0.055)	(0.043)	(0.055)
Office/Service and sale staff			-0.143***	0.069	-0.139***	0.098**	-0.140***	0.093**
			(0.039)	(0.042)	(0.039)	(0.042)	(0.038)	(0.043)
Other skilled workers			-0.009	-0.035	-0.012	-0.024	-0.012	-0.028
			(0.028)	(0.045)	(0.029)	(0.045)	(0.029)	(0.044)
Types of firm (Ref: Stated-owned firm)								
Private firm					-0.028	0.046	-0.029	0.054*
					(0.025)	(0.031)	(0.025)	(0.031)
Foreign invested firm					0.050	0.220***	0.044	0.226***
					(0.046)	(0.043)	(0.045)	(0.043)
Marital Status								
Married							0.138***	0.154***
							(0.032)	(0.039)
Divorced/Separated							-0.001	0.110*
							(0.066)	(0.057)
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,357	1,189	1,357	1,189	1,373	1,189	1,357	1,189
R-squared	0.410	0.409	0.435	0.447	0.436	0.459	0.445	0.467

Note: In all regressions, constant and province dummies are included but not reported. Robust standard errors are in parenthesis.
*, **, and *** denote significance at 10%, 5%, and 1%, respectively

Source: Authors' calculations from VHLSS 2014

Wage estimates after selection bias correction with province fixed effects

Table 5.15: **Wage results after selection bias with province fixed effects**

	Heckman		**DMF**	
	Male	**Female**	**Male**	**Female**
	(1)	(2)	(3)	(4)
Age	0.040**	0.051***	0.013	0.122***
	(0.017)	(0.017)	(0.022)	(0.023)
Age square (/100)	-0.033	-0.047*	-0.002	-0.148***
	(0.023)	(0.024)	(0.028)	(0.031)
Education (Ref: No education)				
Primary	0.105*	0.145*	0.091	0.206***
	(0.059)	(0.074)	(0.063)	(0.079)
Lower Secondary	0.209**	0.229**	0.184***	0.316***
	(0.061)	(0.076)	(0.061)	(0.076)
Upper Secondary	0.325***	0.371***	0.344***	0.490***
	(0.062)	(0.083)	(0.064)	(0.088)
Vocational	0.306***	0.372**	0.305***	0.874***
	(0.087)	(0.149)	(0.110)	(0.174)
College or above	0.494***	0.631***	0.577**	1.406***
	(0.126)	(0.183)	(0.227)	(0.249)
Non-Kinh group	-0.015	0.036	-0.035	0.089
	(0.057)	(0.059)	(0.066)	(0.074)
Health problem	-0.048	0.110*	0.040	0.073
	(0.065)	(0.060)	(0.089)	(0.072)
lambda	-0.422**	-0.235		
	(0.206)	(0.179)		
m1			-0.352***	-0.167**
			(0.108)	(0.084)
m2			-0.186	-0.966**
			(0.604)	(0.428)
m3			0.361	-1.370***
			(0.286)	(0.278)
Province fixed effects	Yes	Yes	Yes	Yes
Observations	2,362	2,554	2,362	2,554

Note: In all regressions, constant and province dummies are included.
Standard errors are in parenthesis.
*, **, and *** denote significance at 10%, 5%, and 1%, respectively.
The base-line model (model 1) is estimated by Heckman and DMF.
Selection equations are reported in Appendix

Source: Authors' calculations from VHLSS 2014.

5.A.4 The selection equation

Heckman

Table 5.16: **Selection equation - probit estimate**

	Male		Female	
	Coef.	**Std.Err.**	**Coef.**	**Std.Err**
Age	0.151***	0.038	0.115***	0.039
Age square (/100)	-0.224***	0.053	-0.181***	0.055
Born before 1968	0.271**	0.137	0.085	0.145
Education				
Primary	-0.051	0.118	0.084	0.119
Lower Secondary	-0.074	0.117	0.207*	0.119
Upper Secondary	-0.054	0.123	0.362***	0.124
Vocational	0.582***	0.120	1.218***	0.132
College or above	1.126***	0.125	1.763***	0.126
Big city	0.041	0.093	-0.022	0.089
Non-Kinh group	-0.104	0.114	0.089	0.118
Health problem	-0.163	0.129	0.002	0.124
Children under 6 years old	-0.019	0.055	-0.156***	0.059
Elderly aged 60+ years old	0.030	0.078	0.018	0.079
Children under 6 x Elderly aged 60+	0.098	0.099	0.093	0.099
Constant	-2.807***	0.668	-2.733***	0.691
Region fixed effects	Yes	Yes	Yes	Yes

Note: *, **, and *** denote significance at 10%, 5%, and 1%, respectively.

In all regressions, region dummies are included but not reported

Source: Authors' calculations from VHLSS 2014.

Dubin and McFadden

Table 5.17: **Selection equation - multinomial logit estimate**

	Male				**Female**			
	Wage/Salary		**Self-employment**		**Wage/Salary**		**Self-employment**	
	Coef.	**Std.Err.**	**Coef.**	**Std.Err.**	**Coef.**	**Std.Err.**	**Coef.**	**Std.Err.**
Age	0.841***	(0.118)	0.838***	(0.123)	0.501***	(0.091)	0.469***	(0.090)
Age square (/100)	-1.109***	(0.173)	-1.042***	(0.179)	-0.713***	(0.131)	-0.612***	(0.127)
Born before 1968	1.185**	(0.549)	0.971*	(0.553)	0.644*	(0.373)	0.683*	(0.353)
Education								
Primary	0.303	(0.395)	0.458	(0.398)	0.468*	(0.276)	0.408*	(0.244)
Lower Secondary	0.490	(0.393)	0.716*	(0.396)	0.502*	(0.274)	0.177	(0.246)
Upper Secondary	-0.427	(0.372)	-0.421	(0.378)	0.534**	(0.284)	0.028	(0.261)
Vocational	1.411***	(0.424)	0.571	(0.433)	1.622***	(0.315)	-0.534*	(0.313)
College or above	1.080***	(0.384)	-1.205***	(0.416)	2.211***	(0.296)	-1.188***	(0.312)
Bigcity	-0.446	(0.288)	-0.614**	(0.308)	-0.636***	(0.202)	-0.994***	(0.215)
Non-Kinh group	0.180	(0.374)	0.458	(0.383)	0.358	(0.324)	0.272	(0.320)
Health problem	-1.280***	(0.303)	-1.351***	(0.321)	-0.227	(0.284)	-0.364	(0.281)
Children under 6 years old	0.244	(0.194)	0.368*	(0.200)	-0.418***	(0.138)	-0.165	(0.134)
Elderly aged 60+ years old	-0.336	(0.226)	-0.490**	(0.240)	0.102	(0.202)	0.125	(0.203)
Children under 6 x Elderly aged 60+	0.319	(0.358)	0.215	(0.373)	-0.162	(0.219)	-0.578**	(0.230)
Constant	-13.462***	(2.001)	-13.775***	(2.106)	-7.991***	(1.610)	-6.552***	(1.606)
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors are in parenthesis.

*, **, and *** denote significance at 10%, 5%, and 1%, respectively.

In all regressions, region dummies are included but not reported.

Source: Authors' calculations from VHLSS 2014

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Chapter 6

Conclusion

6.1 Main findings

The first empirical study on the reversal gender education gap shows that women's education attainment as measured as the completion of upper secondary has been 17.6 percentage points higher than men's in our sample in rural areas. To explain this gap, we consider various characteristics, including birth order, parent's education, household income, local labour market conditions, and expected economic returns in order to estimate their effects on the upper secondary level completion of young males and females (i.e. 19-20 years old). In particular, parental education is a primary determinant of the children education. However, mother's education has stronger positive effects for both boys and girls. We also find that there is no significant association between household economic resources (as measured by household income, and areas of lands with land-used certificate) and children completion rate at upper secondary level. In addition, we find that females are disadvantaged in the North of Vietnam, in households with head of household of Kinh origin, and in relation to earlier born children. This implies that if females were treated equally to males, in the sense of female completion rates determined by the male estimated coefficients, the gender gap would be substantially higher. Moreover, there is lack of relationship between local labour market conditions and education attainment, except for the loose link between the employment rate ratio by education and men's completion rate. This still leaves unanswered the question of why the option of schooling beyond lower secondary education is so much more attractive to females than males although reversing the gender gap in education does not necessarily imply a reversal of the economic positions of men and women in the labour market.

The second empirical study on gender gap in employment allocation suggests that there is a persistent pattern of male and female labour allocation into wage

salaried employment and self-employment overtime since 2002. Particularly, men are more likely to work in wage salaried employment whereas women tend to be self-employed. The results suggest that education is a key factor of the employment allocation. Education helps to pull both men and women out of not working, and having a higher level of education increases the propensity for them to enter wage salaried employment. Ethnicity is another significant element in employment allocation. The non-Kinh group are more likely to be self-employed. We also find that household characteristics that are related to child cares have significant effects in the selection of employment status. Child care decreases the probability of being in the wage salaried sector for both genders. However, sharing child care with the elderly in the household may be the way for women to exit the self-employment to be wage-earners. To the extent that the process of selection into an employment status is captured by the coefficients of our model, we are able to address the question of what would the employment status of women be, if determined by the male coefficients. We find that the proportion of women working in the wage salaried employment would be substantially higher while the proportion self-employed would be substantially lower. This suggests that females would work in wage salaried sector if the process of employment allocation for females were the same as that for females.

The third empirical study analyses the gender difference in wage in urban Vietnam. We use the basic Mincerian equation to estimate the wage earnings for males and females separately, and find that the women, on average, earn around 8 percentage points less than men. However, in the context of Vietnam and other developing countries where workers might not have been randomly assigned to wage salaried employment, the sample selection bias is a potential issue. A merit of this study is to employ the Heckman two stage and the Dublin and McFadden methods to correct for selectivity bias in sectoral employment allocation. After the selection bias correction, the gender wage gap becomes even bigger. Indeed, women earnings are, on average, estimated to be around two thirds of men earnings based on Heckman two stage method, or just around 40 per cent of men earnings based on Dublin and McFadden. This is because less productive men are selected in wage salaried employment while less productive women are selected in non-wage/salaried employment. Our results also suggest that education plays an important role in wage determination. Males and females, on average, earn more when they obtain higher levels of education. However, the returns for education for females appear higher than that for males, especially at college level or above. In addition, occupation and firm characteristics are also determinants of earnings estimation. Both men and women in managerial positions, and high- or average-level expert

positions, on average, have higher earnings as compared to those in lower positions. Furthermore, by using the Oaxaca-Blinder method to analyse the gender wage gap at mean, we find that the gap is mostly due to the unexplained part or unobserved characteristics.

6.2 Implications

Given the assessment and understanding of gender differences in education, employment allocation and wage, the thesis can be of interest to policy makers. Indeed, policy and scholarly discourse offer alternative interpretations of what they mean to improve women' economic empowerment, and move towards gender equality since gender inequality in education and employment can act as an encumbrance on development in long term. Education inequality can contribute to unequal household bargaining power between males and females. This could potentially affect unequal investment in their children's health, and education due to bias allocation of household economic resources, thereby reducing the quality of the future labour supply (i.e. reducing the average ability of the future workforce), and then long-run productivity growth.

In the first empirical study, our findings present us with a puzzle since there is little in terms of characteristics of the household, the community and the local labour market conditions that can explain the reversal gender education gap. We find that what matters for educational attainment at this level for the most part works against females. The gender differences we find, suggest that unequal treatment of girls has a negative impact on their educational attainment and that in the absence of such unequal treatment the reverse gender gap would be even larger. Furthermore, there is no government policy specifically aimed at reducing education costs of women, and women are still paid on average about 90 percent of men's pay. Although it is clear that women are disadvantaged in education and in the labour market, the reasons for their higher educational attainment relative to men, are not clear at all. We cannot say to what extent the reverse gap is due to men's incentives to exit education and to what extent it is due to women's incentives to stay in education. The disadvantages women face in education raise equity concerns, and the differential incentives to stay or exit education raise efficiency concerns. But we do not know enough to say whether women are possibly over-educated, or perhaps men are under-educated. Over-education implies the need for high quality jobs that make use of the high skills of the workforce while under-education implies the need for up-skilling through training.

In the second empirical study, our findings present a significant gender differ-

ence in labour allocation into wage salaried sector or self-employment. However, in practice, most self-employment jobs in Vietnam are own-account vendors, which reflects insecurity rather than flexibility. This resonates with our simulation results showing that females would rather work in wage salaried employment than in self-employment if the process of employment allocation for females were the same as that for males. Furthermore, the third empirical study shows the important role of selection bias in sectoral allocation in the gender wage gap. After the selection bias, the gender wage gap becomes even bigger as less productive men are selected in wage/salaried employment while less productive women are selected in non-wage/salaried employment.

As a consequence, there are key objectives for achieving gender equality in the labour market, including an increase in women's wages, greater job security, improvements in terms of employment, and creation of new formal sector jobs (Menon & van der Meulen Rodgers, 2016). For example, it is generally recognised to offer equal pay for equal work, which means that same amount of wages are paid to women and men doing the same or nearly the same work. Enforcing anti-discrimination measures will provide women with more rewarding career opportunities, thereby eliminating workplace biases. In addition, the counteract improvements in education and experience that women have achieved tackle their predominant presence in non-wage salaried employment. Crucial policies to bolstering women's progress towards equality in the formal sector are maternity leave benefits and public support of child care services. Recently, the Vietnamese government has extended the maternity leave to 6 months for women workers with basic benefits, and even 4-month-old children are officially accepted in public child care, which helps women to prioritise their time in order to contribute more in the labour market.

In short, a better understanding of gender inequality will help to build gender-sensitive policies to obtain inclusive growth.

6.3 Suggestions for future research

With detailed discussion about main findings, contributions and implications, the final section aims at identifying future work.

VHLSS can be used instead to identify the reversal gender education all over the country with bigger sample size. However, details of the commune characteristics may not be known in order to extract some variables as requested.

In the first paper, there is still an unanswered question whether why the completion of upper secondary school is more atttractive to females than males. There-

fore, it would be excited to follow up and try to find what main factors drives the reverse of gender gap in education in the future work.

Furthermore, the second and third studies can be extended to understand how gender differences in employment allocation and wage have changed over time. The same methodology can be applied to analysed data from previous years.

References

Menon, N., & van der Meulen Rodgers, Y. (2016). Women's labor market status and economic development. In *The oxford handbook of women and the economy.*